

## APPENDIX A

Projections, Assessment and Plan Integration

# San Francisco Bay Area Environmental Management Plan

June 1978

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## APPENDIX A

### Projections, Assessment and Plan Integration





## INTRODUCTION

This is Appendix A of the Environmental Management Plan for the San Francisco Bay Region, adopted by the General Assembly of the Association of Bay Area Governments on June 10, 1978. As the first appendix volume in a series of Appendices, it contains background information and explanatory materials used in the development of the EMP as a whole. Background information and explanatory material for the separate management plans are contained in Appendix B (Water Quality Technical Materials), Appendix E (Water Supply Technical Report), Appendix F (Solid Waste Technical Materials) and Appendix G (Air Quality Technical Materials).

This Appendix contains the following materials:

Part 1. Background historical materials on environmental management in the Bay Area:

- Plan Integration and Administration Discussion Paper 1, Environmental Management Needs in the San Francisco Bay Area, September 1976.
- Plan Integration and Administration Technical Memorandum 1, Areawide Environmental Management: Six Decades of Regional Approaches in the Bay Area, May 1977.

Part 2. Series 3 Projections information on which the Environmental Management Plan adopted by the General Assembly was based.

Part 3. Assessment procedures information and technical materials used in assessment of the plan recommendations under the National Environmental Policy Act and the California Environmental Quality Act.





PART 1

PLAN INTEGRATION AND ADMINISTRATION





Discussion Paper 1/September 76

## ENVIRONMENTAL MANAGEMENT NEEDS IN THE SAN FRANCISCO BAY AREA

This paper was prepared by ABAG staff for review by the Plan Implementation Committee of the Environmental Management Task Force. Statements in the paper should not be interpreted as recommendations of the EMTF or policies of the Association of Bay Area Governments. A list of questions is provided at the conclusion of the paper as a basis for discussion.

### INTRODUCTION

Environmental management problems are not new. We have known of them for a number of years, and many people have worked intensively to solve them. Still, our waters are not as clean as they could be. We are making real progress in eliminating pollution from municipal and industrial "point" sources, but surface runoff remains a problem. Despite vigorous controls of some sources of air pollution, the region's air is still dirty. We will soon run out of land to bury our garbage in, and even sooner we will have problems in disposing of hazardous solid waste.

We have tended to deal with these and other environmental problems one at a time. For example, when the region's air pollution problem became apparent, the Bay Area Air Pollution Control District was established by the State legislature to control stationary sources. This was not an isolated incident. Regulatory strategies were typically, though not always, formulated on a single-function, single-purpose basis.

This process led to the establishment of several single mandate environmental regulatory agencies. These agencies are usually required to regard their particular assignments as being of unique importance, and they act accordingly.

Environmental concerns have been extremely popular in the last ten years. It was during these years that most environmental quality standards were established. In part because of considerable popular support, many of these standards are very restrictive and were set without full appreciation of their economic and social impacts. Little or no room was left for negotiation or "trade offs."

Now the Bay Area has several single-function environmental agencies enforcing strict standards. The region also has high unemployment and other economic and social problems. The agencies with environmental regulatory authority have no effective means of including economic, social, and other environmental considerations in their decision-making. While city and county governments do consider economic and social factors, their authority to deal with regional environmental problems is limited.



The situation can be summarized as follows:

- o We have environmental problems. We are making progress in solving them. There is more to be done, but it will involve measures with significant social, economic, and other environmental effects.
- o Decisions on actions to improve our environment are made primarily by single-purpose environmental agencies. Economic and social factors receive primary consideration by city and county governments or other local agencies.
- o We have economic and social problems, not the least of which is unemployment. Solutions for environmental problems could aggravate economic and social problems.

This situation leads to a number of environmental management needs. These needs can be divided into two general categories: those relating to the content of environmental decisions and those relating to the process of making such decisions. In the content category there are four entries:

1. Environmental decisions should take into account non-environmental factors.
2. Decisions affecting the environment should be coordinated among agencies and jurisdictions.
3. Decisions on single projects should consider the overall environmental effects of a number of such projects.
4. Environmental impact analysis should be relevant to the decision to be made.

The procedure category has three entries:

1. The decision-making process should be clear to all participants.
2. The decision-making process should be shorter and less expensive.
3. The decision-making procedures of various agencies should be as consistent as possible and changes in procedure should not be made unless there is a clearly defined need.

The following is a brief description of each need and an account of why it is important, after which are examples of problems in the Bay Area that illustrate each need.

## NEEDS RELATED TO THE CONTENT OF DECISIONS

### Environmental Decisions Should take Into Account Non-Environmental Factors

At the regional and State level agencies have been created to deal with a single problem at a time. The regional environmental agencies are as follows:

- o Regional Water Quality Control Board
- o Bay Area Air Pollution Control District
- o Bay Conservation and Development Commission
- o North Central Coastal Commission
- o Central Coastal Commission



There are also the Bay Area Sewage Services Agency (until the end of 1976) and the Metropolitan Transportation Commission, whose actions directly affect the environment. State agencies include:

- o State Water Resources Control Board
- o State Air Resources Board
- o State Solid Waste Management Board.

At the federal level there is, of course, the Environmental Protection Agency with broad environmental authority.

In making decisions, these agencies often do not consider factors outside of their particular interest. In fact, in some cases the laws and regulations under which they operate do not allow them to take non-environmental factors into account.

An example of this problem is the action of the Bay Area Air Pollution Control District in denying a permit to Dow Chemical for a proposed plant in Solano County. The action was taken without consideration of the economic benefits of the project.

Actions of the Regional Water Quality Control Board provide other examples. Typically, the board sets requirements without formally considering their overall social and economic effects or their fiscal impact on local jurisdictions.

#### Decisions Affecting the Environment Should Be Coordinated Among Agencies and Jurisdictions

There is little incentive for jurisdictions to coordinate their decisions. The rules, regulations, and mandates of different environmental agencies may conflict or overlap. Unless environmental decision-making is more effectively coordinated, inefficiency and duplication will persist. The overall result will be decisions that ignore a broader definition of the public interest. Examples of this need are as follows:

- o Class 1 landfill sites are regulated by both the Regional Water Quality Control Board and the Bay Area Air Pollution Control District. The regulations contain conflicting design specifications.
- o Decisions on transportation facilities have been made with relatively little consideration of their impact on air quality.
- o EPA is attaching certain air quality mitigation measures to its sewage construction grants. These conditions are at cross-purposes with the mandates of the State Water Resources Control Board (to allocate grant funds and clean up the water) and are not necessarily agreed to by the State Air Resources Board.

#### Decisions on Single Projects Should Consider the Overall Environmental Effect of a Number of Such Projects

Most environmental decisions are made on a project-by-project basis. This makes

it difficult to consider the cumulative effect of a series of such decisions. The effect of a single project may be insignificant, but the approval of the project sets a precedent for the approval of other projects, and the environmental effects of all the projects together can be significant.

The best example is the approval by local governments of individual developments. Other examples include the decisions to build roads or provide water or sewage service.

#### Environmental Impact Analysis Should be Relevant to the Decisions to Be Made

Environmental impact analysis is often criticized on several grounds. For example, it is common to define impacts as the difference between present conditions without the project and future conditions with the project. The real comparison should be between future conditions with the project and future conditions without the project.

Environmental impact statements or reports are often long on data and short on analysis. The result is that although information is there, it is not readily accessible to those who need it.

A third example is that an EIR or EIS does not describe the overall importance of the project in combination with other related projects that are sure to follow.

#### NEEDS RELATED TO THE DECISION-MAKING PROCESS

##### The Decision-Making Process Should Be Clear to All Participants

Local government officials and representatives of industry often express the opinion that they do not understand the maze they must traverse to implement a project. Projects require dozens of permits and approvals to comply with regional, State and Federal regulations that are often overlapping, duplicative, or conflicting.

The rules for finding one's way through the process are not written down in any one place. Thus, public and private officials who are not familiar with these procedures must gain that experience. Moreover, citizens interested in a particular application must also learn part of the complicated decision-making process.

Because the process is often complex, it takes time for a governmental or industrial official to comprehend it -- and a great deal more time to undertake it. This, of course, costs money. For the participating public, the task is equally burdensome. Also, if projects are set back, benefits will not accrue on time. These problems underscore the need for a decision-making process that is clearer to all involved.

Examples of this problem include the bewildering task that the Dow Chemical Company embarked upon to receive permission to construct its plant in Solano County. More than 60 permits and approvals have been required to date. In trying to obtain a discharge permit for a sanitary landfill adjacent to San Francisco Bay, the City of Palo Alto was faced with a two-year period of uncertainty while regulations of the Regional Water Quality Control Board were being revised. During this period city staff did not know the correct procedure for approvals.

##### The Decision-Making Process Should Be Shorter and Less Expensive

A project that has an impact on the environment will typically take years to progress from the planning stage to implementation. If an application for funding



is involved, the process can stretch on even longer. In most cases, time is spent collecting data and preparing an EIR and/or an EIS, both in draft and final forms. Applicants may be required to secure a large number of permits or approvals sequentially. Denial of an application will likely lead to a lengthy appeals procedure. Public hearings must be held after sufficient advance notice has been given. There may even be litigation, and usually the fear of litigation by both the applicant and decision-maker lengthens the process. Applicants who choose to complete the process usually seek legal and/or other consultant assistance.

The process, therefore, is very costly. This cost may prevent a person or organization from undertaking a project, e.g., a private home along the coast. If the project is undertaken, users of the applicant's products or services will eventually be paying these costs. They will occur as higher wastewater treatment fees, more costly consumer items, higher priced housing, and so on. Moreover, the social distribution of these costs may be undesirable. In addition to the problem of costs, the benefits from a project will also be deferred for the length of the process. Smaller or more innovative projects may be cancelled or postponed unless they are bankrolled sufficiently. Finally, citizen interest may lag over the length of the decision-making process, and thus all points of view may not be heard.

One example of this need is the time it has taken to implement sewerage projects. Many of the 80 to 90 projects in the region have been delayed for months because of the lengthy decision-making process. This delay coupled with inflation has increased the cost of the facilities by millions of dollars. Housing developments often must go through a multi-year approval process before construction can begin, and one low- and moderate- income project in San Francisco has to date been in the application process for five years. All of this takes place while overall development costs are rising by millions of dollars per year in the Bay Area, and developers are paying interest rates as high as 14 percent on borrowed money.

The Decision-Making Procedures Used By Various Agencies Should Be As Consistent As Possible, and Changes in Procedure Should Not Be Made Unless There Is A Clearly Defined Need

Permit procedures for air quality, water quality, solid waste disposal facilities, zoning, and other actions affecting environmental quality are quite different from one another. They vary across jurisdictional levels as well. Rules and regulations differ widely depending on the type of project, the nature of the authorization sought, and the project reviewers.

Moreover, these procedures are constantly changing. Where changes are dictated by new information there should be changes. But sometimes the process is changed simply because different people, staff or decision-makers are administering the process. In such cases, the necessity for change is questionable.

The result of change is often that applicants must relearn the process. Citizens wishing input also face the same problem.

The primary effects are higher costs, and delayed project benefits. In addition, a changing process is likely to produce uneven results, and issues once resolved may be raised again later. This can lead to a distrust of regulatory institutions in general so that people have the feeling that bureaucracies have been established

only to foil them. If the process were more standardized, and if changes were made only when clearly needed, the situation would be much improved.

For example, state guidelines for the preparation of environmental impact reports are currently undergoing revision for the fifth time since they were initially issued in February of 1973. The Bay Area Air Pollution Control District adopted, though never put into effect, regulations for the review of indirect sources of air pollution; they had been adopted for one month when the agency postponed and then suspended them.

## CONCLUSION

ABAG staff has prepared this paper to serve as the basis for discussion by EMTF and its Plan Implementation Committee. It is suggested that the discussion cover the following:

- o Is this paper an accurate statement of the Bay Area's environmental management needs? Are there others? Can some be stated better? Should some be omitted?
- o What changes in environmental management should be made so that the needs identified in this paper can be met?

AREAWIDE ENVIRONMENTAL MANAGEMENT:  
SIX DECADES OF REGIONAL APPROACHES IN THE BAY AREA

INTRODUCTION

Nearly two decades ago Mel Scott described the San Francisco Bay Area as a metropolis with a little-understood sense of its own history. Scholars had produced many volumes on the historical development of the region's cities and counties, but Scott's book\* was the first definitive account of the Bay Area as a regional community.

This paper updates and summarizes a small part of that history--the development of regional approaches to Bay Area problems. It is a background document prepared for the Environmental Management Task Force's Plan Implementation Committee, which is supervising the preparation of the governmental and financial recommendations to be included in the Bay Area's environmental management plan.

The paper is a historical account, and describes the changing nature of approaches to regional problems. The approaches have been of three kinds: service delivery on an areawide basis, regulation on a regional basis, and planning on a regional basis. The period from 1910 to 1977 was characterized almost exclusively by the creation of special-purpose agencies and by the failure to bring these agencies together in a coordinated way. Thus the Bay Area has a highly complex system of decision-making--more complex perhaps than any other metropolitan region in the country.

Environmental management is the responsibility of every level of government--Federal, State, regional and local. In the San Francisco Bay Area, nine counties and their 93 cities each have responsibilities that affect the quality of the air and water, and the methods for handling solid waste. The activities of these jurisdictions, however, are shared with Federal and State agencies, regional regulatory and planning agencies, and a large number of districts. Of the Bay Area's 825 special districts, 212 have environmental management responsibilities. These include:

- Drainage and drainage maintenance
- Electric utility
- Flood control and water conservation
- Harbor and port facilities
- Land reclamation and levee maintenance
- Recreation and parks
- Soil conservation
- Streets and roads
- Waste disposal
- Water utility

\*The San Francisco Bay Area - A Metropolis in Perspective. University of California Press, 1959.



In addition, local governments, including special districts, may join with others under the State's joint exercise of powers law for environmental management purposes. Most of the large sewage treatment projects under Section 201 of the Federal Water Pollution Control Act, for example, are being constructed or operated by joint powers agencies. There are also contractual arrangements to do this.

This paper concentrates on the creation of regional agencies--covering more than one county, although it does not describe the formation of joint powers agencies used to plan, build and operate 201 projects. The paper also analyzes the key issues involved in unsuccessful and successful regional agency legislation. For the purposes of this paper, service-delivery agencies are those that directly provide such things as water, sewage treatment or parks. Regulatory agencies have permit-issuing authority, while planning agencies are those where planning is the most important activity. Some agencies have mandated planning and regulatory functions--the San Francisco Bay Regional Water Quality Control Board, the San Francisco Bay Conservation and Development Commission, and the coastal commissions are the most important examples.

### THE EARLY BEGINNINGS OF "REGIONALISM"

"Regionalism" is a phrase that describes a willingness to depend on areawide solutions--and agencies if necessary--to solve problems that local governments acting alone cannot solve. Regionalism in the Bay Area got its start shortly after the turn of the century, with the San Francisco press predicting the formation of a Greater San Francisco within a few years. After the San Francisco earthquake and fire of 1906, the California Promotion Committee and later the San Francisco Chamber of Commerce formed a Greater San Francisco Association. For years afterwards, the impetus for regional planning occurred within the business and civic communities of San Francisco. It was not until 1923, however, that real steps were taken to knit the Bay Area together in a regional community--not called Greater San Francisco but probably linked forever to San Francisco Bay.

### A MODEST START ON MULTI-COUNTY SERVICES

Urbanization of the East Bay--primarily around Berkeley and Oakland--near the turn of the century marked the first widespread public recognition that cities and counties might not be able to assume services that private industry could no longer provide. At that time, the East Bay's only source of water was the local watershed. This supply fluctuated annually, and was clearly inadequate to meet existing and anticipated needs. The area was then served by the privately owned East Bay Water Company. The years 1917 to 1918 brought low rainfall and a water crisis. Adding to the problem, World War I increased industry needs for water, and more people were attracted to the Bay Area. Partial water rationing was enforced, and talk of public water ownership spread. The water problem had become too large for a private corporation. State action became necessary.

The Municipal Utility District Act was passed by the State legislature in 1921. Because the legislature authorized water service (as well as electricity, transportation, communication, waste disposal and recreation) across county lines, this law was the first state recognition that regional approaches were needed.

### East Bay Municipal Utility District (EBMUD)

EBMUD, the oldest multi-county special-purpose district in the Bay Area, was organized by voter referendum in May 1923. The referendum passed in Oakland, Berkeley, Alameda, San Leandro, Emeryville and El Cerrito. Although Piedmont and Richmond voters did not pass the referendum, the two cities soon joined the district. The district's governing body is a five-member board of directors, elected from wards.

A 1924 district bond election provided \$39 million for the construction of Lancha Plana Dam on the Mokelumne River. The bonds were to be paid from taxes and water revenues. The dam, later renamed Pardee (after an EBMUD Director) would provide 200 million gallons of water a day--then the anticipated demand in 1977. The dam was completed, five years later, in 1929. In contrast, San Francisco's Hetch Hetchy project, which began in 1914, did not bring water to the city until 1934.

East Bay cities also turned to EBMUD for other services. By 1940, sewage and industrial wastes being dumped in the Bay had become a large and smelly problem appropriately nicknamed the "Big Stench." Pollution was killing off the natural wildlife in the bay: oyster beds and bay shrimp. Again a situation occurred that no city could solve alone. EBMUD's familiarity with the topography, streets and pipelines of the East Bay, as well as its engineering know-how, put the district in a good position to tackle the problem. In 1944, with the war's end imminent, EBMUD Directors submitted a proposal to northern Alameda County voters to form a sewage district within the district. The proposal passed. Construction costs of the sewage system were met by a \$23.5 million bond issue passed in 1946. In 1951, the sewage treatment system, built on the Oakland bay shore, began operation. In 1966, EBMUD added another function, with the opening of Lafayette Reservoir for public recreation use.

### East Bay Regional Park District (EBRPD)

While the East Bay Municipal Utility District directors later broadened district activities to include sewage treatment and recreation, the district's first opportunity to provide something other than water led instead to the formation of another special purpose agency--the East Bay Regional Park District.

In the late 1920s, a group of citizens formed the East Bay Regional Park Association. The association's goal was the development of regional parks in surplus watershed lands owned by EBMUD. It was hoped that the legislature would broaden the functions of the district to include parks. However, the chairman of EBMUD opposed expanding the scope of the district, thus forcing the association to find another way of establishing the much-desired parks.

In 1933 the legislature enacted the Regional Park District Act. The act authorized two or more cities with contiguous territory, whether in one or more counties, to form a park district within the boundaries of the

already existing utility district. In 1934, Alameda, Albany, Berkeley, Piedmont, Emeryville, Oakland, and San Leandro voters approved formation of the district--known as the East Bay Regional Park District. In 1956 Eden Township was annexed to the district and in 1958, the Washington Township joined the district. Contra Costa County, except for the Liberty Union High School District, annexed in 1964. The regional park district made its first purchases in 1936, acquiring more than 2,200 acres in the Berkeley Hills. In the late 1930s, the district expanded to include 4,250 acres. The district is governed by a seven-member board of directors elected from the wards. All operations and acquisitions have been financed from park revenues and a property tax.

#### The Valley Community Services District (VCSD)

This district was formed in 1953 as the Parks Community Services District, but remained relatively inactive until 1960, when a private company began developing San Ramon Village. Since no municipal-type services were then available in the area, the developer requested annexation to the district, and suggested that the district begin to provide such services. The name was changed to the Valley Community Services District; it is the only community services district in the Bay Area to cross county boundaries. The district provides fire protection, water, sewage treatment, recreation and parks. The district has property taxing and bonding powers. It is governed by a five-member board of directors elected at large within the district, which covers about 7,200 acres within Alameda and Contra Costa Counties.

#### The North Marin County Water District (NMCWD)

This district was formed in 1948 to alleviate the problem of insufficient ground water in northern Marin County. A local reservoir was built at Stafford Lake. By 1961, the lake was inadequate to meet the water agency aqueduct system, which also serves seven other districts. Two portions of Sonoma County--a 324-acre parcel in 1961 and a 48-acre parcel in 1967--were annexed to the district, making it the third Bay Area multi-county water district.

In 1973 district voters approved a bond issue expanding the water agency aqueduct system, obtaining water from the Russian River. Seventy-five percent of the district's water supply is from the river, with the remainder coming from Stafford Lake. The district covers 110 square miles, but also provides water service to 37 dairies outside its boundaries in Marin and Sonoma Counties. The district also provides sewage services to several Marin coastal communities. The district has a five-member governing board elected at large.



## LARGE-SCALE REGIONAL APPROACHES: BAY AREA TRANSPORTATION DISTRICTS

The modest approach in multi-jurisdictional service delivery begun in the East Bay in the 1920s was also used in public transportation with the formation of the Alameda-Contra Costa Transit District. Elsewhere in the Bay Area, however, regional public transportation on a larger scale was set in motion--in the Golden Gate Bridge District in the 1920s and the San Francisco Bay Area Rapid Transit District in the 1950s.

### The Golden Gate Bridge, Highway and Transportation District (GGBHTD)

The need for a bridge spanning the Golden Gate strait was clear by the early 1920s. Steam ferry boats running from San Francisco to the northern counties were expensive, and inadequate to meet growing pedestrian and automobile traffic. At a public meeting in Santa Rosa in January 1923, legislation was proposed to make possible the building of the Golden Gate Bridge. By May of the same year, the legislature passed the Bridge and Highway District Act, specifically to build the Golden Gate Bridge.

The Golden Gate Bridge and Highway District was created by the Boards of Supervisors of the City and County of San Francisco, and of the counties of Marin, Sonoma, Napa, Mendocino, and Del Norte.

However, opponents of the bridge brought court actions against the ordinances creating the district. In late 1928, after favorable court decisions, the district was incorporated. Bridge directors were then appointed by supervisors of the participating counties.

In 1930, district voters approved a \$35 million bond issue to construct the Golden Gate Bridge. Construction began in 1933, and was completed in 1937.

In 1969, directors authorized the name change to Golden Gate Bridge, Highway and Transportation District, which became effective with State legislation that enabled the district to engage in all forms of mass transit. District revenues come almost exclusively from bridge tolls and farebox revenues.

### Alameda-Contra Costa Transit District (AC Transit)

From about 1963 to the middle 1950s, Alameda and Contra Costa Counties were primarily served by private transportation companies. By 1950, however, the East Bay had only one transit company--the Key System (named after the key-shaped transit lines that had provided train-ferry service to San Francisco until interurban trains were routed across the Bay Bridge in 1939).

Problems of increasing automobile congestion and the difficulty of operating at a profit preceded a 76-day transit strike in 1953. At the time, the idea of a public transportation system was suggested as the only possible solution.

In 1955 the legislature enacted legislation permitting the creation of a public agency to operate transit services. The following year, voters in Alameda and Contra Costa Counties established the Alameda-Contra Costa Transit District.

The district is governed by a seven-member Board of Directors elected by ward. A \$16.5 million bond issue was approved by the district's voters in 1959. The bond issue provided funds to buy out the predecessor company, Key System Transit Lines, and to get the district on a pay-as-you-go basis. The district has property tax-levying power in addition to its farebox revenues and State and Federal subsidies.

### San Francisco Bay Area Rapid Transit District (BART)

As far back as 1946, informal gatherings of business and civic leaders were discussing ways to ease traffic congestion on the Bay bridges and highways. These concerns were also recognized in the State legislature, which created the 26-member San Francisco Bay Area Rapid Transit Commission in 1951, with representatives from the nine counties of the bay. The commission was to study the Bay Area's long-term transportation needs in the context of environmental problems, and recommend a solution. The commission's final report, in 1957, advised that any transportation plan must be coordinated with the area's total plan for future development. Because no development plan existed, the commission prepared one. This plan did much to coordinate planning in the Bay Area, and its basic ingredients were embodied a decade later in ABAG's regional plan.

The commission recommended formation of a five-county rapid transit district. The same year, the legislature formed the San Francisco Bay Area Rapid Transit District for the counties of Alameda, Contra Costa, Marin and San Mateo, and the city and county of San Francisco. Engineering plans for the rapid transit system were developed from 1957 through 1962. A final plan was submitted to the supervisors of the five district counties in 1961. San Mateo supervisors withdrew from the district, citing the expense of the proposed system, and the adequacy of their system of the time. Marin also withdrew from the district, in 1962, because its tax base could not adequately absorb its share of the projected costs and because of a controversy over the feasibility of carrying trains across the Golden Gate Bridge.

In the 1962 elections, the rapid transit plan passed, with 61.2% of the vote. The plan required 50% voter approval. Voters also approved a \$792 million bond issue to finance the transit system. Additional cost of the transbay tube, estimated at \$133 million, was to come from bonds issued by the California Toll Bridge Authority and secured by future Bay Area Bridge revenues.

Construction of BART began in 1964, and in 1972 BART began service in the East and West Bay. The transbay tube was opened in 1974. BART was originally governed by a 12-member board of directors, appointed by the supervisors and mayors' conferences in the member counties. In 1974, however, the State legislature established a nine-member board of directors--elected from voting districts.



## SECOND-GENERATION REGIONAL APPROACHES: TWO REGULATORY AGENCIES

A modification of the first approach to regional problems occurred in the late 1940s. The modification was part of a Statewide regulatory approach to water pollution, and was used similarly a few years later to control air pollution.

### The Regional Water Quality Control Boards

Water pollution and degradation of water in California accompanied rapid population growth and industrial development in the State during and immediately after World War II. By 1947 the water quality problem had become so acute that the State Assembly named a fact-finding committee to determine the extent of water pollution and develop solutions. In 1949, based on the committee's report, the legislature passed the Dickey Water Pollution Control Act. All waters within the State were placed under the protection of the act, with nine regional water quality control boards and a State Water Quality Control Board. These agencies were the premier water pollution control agencies in the State from 1949 to 1967. In 1967 the legislature rewrote water quality laws, preserving the nine regional boards but reconstituting two Statewide agencies into a single State Water Resources Control Board. The Porter-Cologne Water Quality Control Act of 1969 spelled out the powers of the State and regional boards.

The San Francisco Bay Area is covered by four regional boards. Most of the nine counties--the territory draining into San Francisco Bay--falls within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board. The northern portion of Sonoma County is included within the North Coast Region, and the southern portion of Santa Clara County is within the Central Coast Region. The northeastern portion of Napa and Solano Counties, and the far eastern portions of Alameda and Contra Costa Counties, are included in the Central Valley Region.

Each regional board has nine members, appointed by the governor. The boards are authorized to develop regional water quality (or basin) plans perform regulatory functions through municipal and industrial discharges. They are funded by the State legislature through the State's general fund. The San Francisco regional board has 44 employees and a 1976-77 budget of \$1.2 million.

### Bay Area Air Pollution Control District

In 1947 the California legislature permitted the formation of county air pollution control districts. Santa Clara County first recognized the potential for a Bay Area air pollution problem, and created a county district in 1948.

A short time later, other groups and counties in the Bay Area became increasingly concerned with the regionwide air pollution problem. Extensive investigation by an Assembly joint subcommittee concluded that a regional strategy should be developed because of the peculiar geography of the

Bay Area, and proposed the creation of a single air pollution control district within the nine counties. In 1955, the legislature created the Bay Area Air Pollution Control District--the first regional agency dealing with air pollution to be formed in the nation.

Six of the nine counties elected to join the new district. The legislature in 1970 required Napa, Solano and Sonoma Counties to join the district (although each of the three boards of supervisors was permitted to determine the exact boundaries of the air district in each county).

The jurisdiction of the BAAPCD, like that of other air pollution control districts, is limited to regulating stationary sources of air pollution, primarily industry emissions. The district has adopted and enforces a number of regulations governing existing and proposed stationary sources. The district has no regulatory power over automobile emissions, although its staff may cite drivers of cars with visible emissions. The district's 1976-77 budget is \$6.1 million, and it has 213 employees. Sixty percent of the district's revenues come from county property taxes. The tax rate for the district cannot exceed \$.02 for each \$100 assessed valuation, the limit set by the State legislature.

The district originally had two directors from each county, but in 1976 the legislature provided for a 18-member appointed board, but apportioned on a population basis, giving more representation to the more populous southern counties.



### THIRD-GENERATION APPROACHES: THE REGIONAL PLANNING AGENCIES

The early approaches to regional decision-making--either for service delivery or for environmental regulation--could not adequately address certain problems Bay Area local governments faced by the late 1950s. Among these were transportation, metropolitan water supply and sewage disposal, solid waste disposal, and air and water pollution. In 1959, Governor Edmund G. Brown Sr. appointed the Commission on Metropolitan Area Problems to study and make recommendations on critical issues facing all urban areas of the State. The same year, a bill was introduced in the legislature to establish a Golden Gate Authority to operate all bay bridges and the principal ports and airports of the region. (The authority was not created but a study commission led to a similar recommendation in 1961).

These events at the State level seemed to prompt some local government officials into acting. The staff of the League of California Cities and the University of California's Bureau of Public Administration, together with some mayors and city managers in the area, began informal considerations of what might be done by city governments themselves to find solutions to their common environmental, social and economic problems. It was believed that if local government did not tackle these problems, soon the people of the area would ultimately turn to the State for relief, possibly to the disadvantage of local government. After a few informal meetings of this group it became clear that the issue should be brought to the attention of all city governments in each of the nine Bay Area counties. Berkeley Mayor Claude B. Hutchison was requested to call an areawide meeting of representatives of all cities in the area.

#### The Creation of the Association of Bay Area Governments

One hundred and twenty delegates from 56 cities came to the meeting called by Mayor Hutchison. This conference accepted the general concept of a metropolitan council and requested the appointment of a committee consisting of the mayors of the principal city in each of the nine counties of the area to propose the composition, method of organization and bylaws for the formation of a Bay Area Metropolitan Council.

In the meantime supervisors of the nine counties, hearing of the cities' actions, decided to form a similar committee themselves to become involved with the same problems and perhaps make a comparable approach to their solution.

The mayors' committee proposed that the two committees be merged into one. This was done, but the group soon was faced with another problem--a name for the organization. The city committee had been using the term "Bay Area Metropolitan Council" yet the supervisors' committee didn't like the term, for it had too much of an urban or city connotation. Mayor Hutchison once recalled the final choice this way:

"Finally one morning while shaving--a time of day which I have found in a fairly long life to be conducive to creative thinking--the name, Association of Bay Area Governments, came to mind. At the next meeting of the committees I proposed this name which proved to be acceptable to both committees."

On May 5, 1960, 135 delegates representing nine counties and 52 cities met to consider the work of the supervisors' and mayors' committee that had drawn up bylaws for the proposed Association of Bay Area Governments (ABAG). The delegates overwhelmingly approved the bylaws and recommended that each board of supervisors and city council in the Bay Area authorize execution of an agreement under the Joint Exercise of Powers Act of 1921. At present, seven of the nine counties and 87 of the 93 cities are ABAG members. On July 1, 1977, Solano County will become the eighth ABAG member county.

ABAG was certified by the U.S. Department of Housing and Urban Development as the areawide review agency pursuant to Section 204 of the Demonstration Cities and Metropolitan Development Act of 1966. That certification of June 1967 was later revised following issuance of Circular A-95 of the Federal Office of Management and Budget in July 1969. Under that circular, ABAG was designated as the Bay Area's clearinghouse for Federal grant applications. In 1975, the association was designated as the areawide waste treatment planning agency under Section 208 of the Federal Water Pollution Control Act Amendments of 1972, and in 1977 ABAG was designated as the air quality maintenance planning agency under the Federal Clean Air Act of 1970. The agency has a 1976-77 budget of \$5.9 million, with nearly \$2 million going to its member governments. Local funds account for approximately 11 percent of the budget. ABAG has 100 employees.

#### San Francisco Bay Conservation and Development Commission

Environmental columnist Harold Gilliam, in his book San Francisco Bay, was among the first to warn against what has always been a dangerous man-caused threat to the bay, indiscriminate filling for urban uses. The Bay, Gilliam wrote in 1957, "should be jealously husbanded." Four years later, the filling of the bay was still unrestrained. Public outcry against fill reached its peak between 1962 (when the Save San Francisco Bay Association was formed) and 1965, when the California legislature established the San Francisco Bay Conservation and Development Commission (BCDC) to regulate through permit authority bay filling until 1969.

The commission was also asked to recommend "the appropriate agency" to maintain and carry out a comprehensive and enforceable plan--to be developed by the new agency--for the bay and its shoreline. BCDC's plan recommended a multi-functional agency be established to carry out the policies contained in it, or, if such an agency was not created, the plan recommended a permanent commission be established to protect the bay from excessive fill and provide public access for recreational purposes.

The legislature in 1969 made BCDC permanent, with 9 of the 27 commissioners appointed by the counties and 4 appointed by ABAG. The others are appointees of the governor, legislative leadership and State and Federal agencies whose decisions affect development. In 1974, BCDC was authorized (with the State Department of Fish and Game) to prepare another plan--for the Suisun Marsh--and has become the planning and regulatory agency for the bay segment of the California coastline. Regulatory powers are exercised by issuing permits for activities within BCDC's geographical jurisdiction. BCDC is financed primarily from the State general fund, with 22 employees and a 1976-77 budget of \$510,000.

#### Metropolitan Transportation Commission and Its Predecessors

Following another unsuccessful attempt in 1961 to create a Golden Gate Transportation Commission, a large group of business, governmental and



civic leaders promoted the development of a comprehensive regional transportation planning program. Such an approach was also made necessary by the 1962 amendments to the Federal Highway Act. These amendments specified that such planning was a condition for Federal aid to highways. To meet these requirements, the Bay Area Transportation Study Committee (with 41 members, 19 of whom represented cities and counties and ABAG) was created by the legislature in 1963.

In its report to the legislature, the committee recommended the creation of a multi-function regional planning and implementing agency, and, in the event such a regional agency was not established, the committee recommended the creation of a special-purpose agency. The multipurpose agency was not created, and a bill to create a transportation agency failed in 1969 (when the committee dissolved). In 1970, however, the legislature created the Metropolitan Transportation Commission (MTC). The commission was given responsibility for transportation planning and authority to allocate Federal and State transportation funds. State highway projects, unless there is an "overriding State interest," must be in conformance with the MTC plan.

MTC is the Federally recognized metropolitan planning organization under the Urban Mass Transportation Act of 1964, administered by the U.S. Department of Transportation. The DOT regulations, as well as the A-95 Circular, require that MTC and ABAG have a memorandum of agreement for coordinating transportation planning with comprehensive planning for the Bay Area. Since 1972, MTC and ABAG (along with the California Department of Transportation) have jointly prepared an overall work program (OWP) for the Bay Area. An OWP is required by Federal funding agencies.

The commission has 16 appointed voting members. It is financed from Federal and State planning funds and 3 percent of each county's sales tax funds for administration of the State Transportation Development Act. The MTC act also requires the merger of the commission into a regional comprehensive planning agency when such an agency is created. The agency has a 1976-77 budget of \$4.5 million and 103 employees.

#### Bay Area Sewage Services Agency (BASSA)

The State legislature created the Bay Area Sewage Services Agency in 1971. BASSA began operations in 1972 with authority to prepare a regional wastewater facilities management plan, and with authority to implement the plan by constructing and operating plants if local governments failed to do so. BASSA was financed by the nine Bay Area counties, with each county's share of revenues not to exceed one-half cent per \$100 of assessed valuation. Several counties in turn received from sewage dischargers contributions to pay the BASSA apportionment.

BASSA was allowed in the original law to make its apportionments for the entire region, although its planning authority was limited to the area draining into San Francisco Bay (as defined in Section 13200 of the Water Code) and the remainder of Contra Costa County. In 1975, the BASSA law was amended to restrict BASSA's revenue raising ability in Napa, Solano and Sonoma Counties. Only the portions of the three counties lying within the water basin could be covered by the agency's apportionments.

BASSA's 21-member board was composed of local elected officials, appointed by county supervisors from a list prepared by city mayors and presidents of special districts involved in water quality control.

The State Water Resources Control Board and the San Francisco Bay Regional Water Quality Control Board several times attempted through agreements and policy advice to ensure that BASSA's work would not duplicate their own. However, BASSA's regional plan, adopted in December 1975, was virtually identical to a basin plan adopted several months earlier by the regional board. This was one factor in a legislative effort to merge BASSA with ABAG in 1976. As noted later, BASSA was abolished by the 1976 legislature.

### The Coastal Zone Conservation Commissions

In 1972 the voters of California--using the model of BCDC--established the California Coastal Zone Conservation Commission and six regional commissions to plan and regulate development along the coastline in the Bay Area. San Mateo County was included within the jurisdiction of the Central Coastal Commission. San Francisco, Marin and Sonoma Counties were included in the area of the North Central Coastal Commission. Following preparation of the coastal plan, the State legislature made the commission permanent, and permitted the continuation of the regional commissions to oversee the development of coastal zone management programs by local governments. Once these local plans are certified, or by January 1, 1981, the regional commissions will cease.

Development permits issued by the commissions are required by the law until after the local coastal programs are approved by the regional commission and certified by the State commission. At that time, most coastal development controls will be delegated to local governments, and only certain categories of development decisions can be appealed to the State commission.



## CHANGES IN NINE-COUNTY REGIONAL APPROACHES

Although many nine-county regional approaches were taken during the 1970s, some steps--primarily in human services planning--led to planning for regions smaller than nine-counties. In 1971, the California Council on Criminal Justice (CCCJ) recognized six "regions" within the Bay Area: Alameda County, Contra Costa County, City and County of San Francisco, Santa Clara County, San Mateo County and the counties of Marin, Napa, Solano and Sonoma.

Affecting CCCJ's decision were the 1970 amendments to the Safe Streets Act. These required states to assure that major cities and counties receive planning funds "to develop comprehensive plans and coordinate functions at the local level." There had also been some efforts in the Bay Area, although not as intense as in Southern California, to get CCCJ approval of county autonomy. ABAG's Criminal Justice Planning Program, organized in 1969 to act as the regional criminal justice planning agency with the approval of CCCJ, had its planning funds reduced. A few years later, ABAG's involvement in criminal justice planning was, for all practical purposes, ended.

In the health field, the 1969 legislature established a nine-county council for planning and review functions relating to delivery of health care. But national legislation in 1974 provided for the designation of health services areas, with health systems agencies created in each one. The Bay Area was divided into four service areas. Napa, Sonoma and Solano Counties are included in one region. Marin, San Francisco and San Mateo Counties are another region, and Alameda and Contra Costa Counties form a third. Santa Clara County is one health services area.

## UNSUCCESSFUL ATTEMPTS FOR A MULTIFUNCTION AGENCY

Each environmental problem in the Bay Area tended to be well defined. A single problem could be dealt with by a special purpose agency. The result over the years was a proliferation of special-purpose agencies. Their continued existence as separate agencies is a result of an unwillingness of the legislature to create a multifunction regional agency that can handle existing, widely recognized regional problems, and that could tackle new environmental, social or economic problems as they arise.

Because the Bay Area has more single-function agencies at the regional level than any area in California (and probably the nation), an important question for many has not been whether to use regional approaches, but how to simplify them.

ABAG has a long-standing policy in favor of a statutory comprehensive regional planning agency. The formal statement of that position is a 1971 resolution of its General Assembly, which noted earlier ABAG positions (in 1966 and 1969) in favor of a multifunction agency.

Like the legislation creating the Metropolitan Transportation Commission, the statutes creating the Bay Area Sewage Services Agency were amended in 1972 (one year after the agency was formed) with a similar provision that BASSA would be consolidated into a comprehensive agency. BCDC's plan also sought the establishment of "limited regional government" that could assume BCDC's then-temporary powers in protecting the bay and its shoreline.

## Early Attempts for Comprehensive Regional Planning

Assemblyman William Bagley authored a bill in April 1969 that would have given the Bay Area a limited function but statutory regional planning agency. The bill was modeled after a report by ABAG's Goals and Organization Committee. ABAG's General Assembly endorsed the bill in June 1969. The new agency would have assumed the powers of BCDC and the Bay Area Transportation Study Commission (BATSC) for one year, and provided that if new legislation making the Bay Area Home Rule Agency permanent failed to pass, the powers of BCDC and BATSC would be assumed by ABAG.

Another bill introduced in 1969 was AB 711, which embodied the recommendations of the legislature's Bay Area Regional Organization (BARO) Committee. The bill provided that a comprehensive planning agency would assume the functions of BCDC, BATSC and the Bay-Delta water quality control program then conducted by the State Water Resources Control Board. The bill never received a hearing.

Assemblyman John Knox (author of the BARO proposal) introduced AB 2310 in 1970. That bill recommended the establishment of a Conservation and Development Agency of the Bay Area, which would have veto power over actions of local and regional agencies. The regional plan would have included BCDC's plan. The bill died in the Senate Governmental Organization Committee in August 1970.



Two modifications were included in Assemblyman Knox's 1971 legislative attempt to give the Bay Area a comprehensive planning agency. The bill (AB 1057) provided for MTC's merger into the new agency but excluded BCDC's plan as part of its responsibilities. This feature recognized the beginning of strong environmentalist opposition to including BCDC in a comprehensive agency. The argument made then was made at each successive attempt since. BCDC's supporters felt that the new commission was beginning to implement its plan--which within a short time had virtually ended the filling of the bay--and these groups did not want the plan to be turned over to a new agency with what they felt was an "unknown future." Knox successfully engineered AB 1057 to a favorable vote by the Assembly, but fell four votes short on the Senate floor.

ABAG's Executive Board next attempted to revise the State's Regional Planning District Law, reconstituting the agency as a regional planning district with powers to implement its regional plan. Knox introduced the bill as a courtesy to ABAG but did not push it.

#### AB 2040: The 1973-74 Legislation

The first version of Assemblyman Knox's AB 2040 provided for the consolidation of three regional agencies whose primary purpose was planning. The bill would have merged ABAG with two statutory single-function agencies--MTC and BASSA. The logic of such a move was this: In no other part of the State were transportation and land use planning at the regional level done by separate agencies. In the Sacramento, Los Angeles and San Diego areas, voluntary associations such as ABAG were designated by the State to perform transportation planning. All three also were responsible for regional land use planning. Since land use decisions and transportation planning are inextricably linked, it made no sense to have the two functions performed separately in the Bay Area. In addition, since BASSA's charge to prepare and implement a wastewater treatment facilities plan was in many ways a land use planning matter, BASSA too should be included, Knox contended.

Passage of the bill was accomplished in the Assembly--although by the bare majority necessary--in August 1973. The narrow margin meant some amendments would be necessary. The San Francisco Planning and Urban Renewal Association held its annual convention on the topic of Bay Area regionalism in November 1973. SPUR concluded that directly elected representatives had to be included on the board of the new agency, and that BCDC and the air pollution control district ought to be included. Governor Ronald Reagan--who prior to that point had not expressed much interest in the bill--asked also if it would be possible to include the other two agencies in the bill.

Knox added BCDC and BAAPCD to the proposed Bay Area Planning Agency in May 1974.

Two protective amendments affecting BCDC were included in June 1974. They included provisions that BCDC's plan would be part of the regional plan of the new agency, but could not be amended except by a two-thirds vote of the

agency (the same provision as the McAteer-Petris Act that made BCDC permanent). The new agency could also obtain legal services from the State Attorney General, as BCDC had done. The amendments failed to satisfy some environmental groups, however.

The Sierra Club asked that the bill be amended to have an agency board composed solely of directly elected representatives (instead of a board half appointed by local governments and half directly elected). Senator Milton Marks, chairman of the Senate Local Government Committee, announced on August 15, 1974 that he would vote against the bill because of a "fatal flaw." The flaw was, according to Marks, the provision that local governments would appoint half the governing board. Marks wanted, he said, a directly elected board. Without his affirmative vote, AB 2040 died in the committee.

### Reconstituting the Legislation

ABAG's Regional Home Rule Goals Committee, the agency's legislative committee, met August 28, two weeks after AB 2040 was killed. At the time there were already initiatives being undertaken by air district directors and the BASSA board for new legislation. ABAG representatives invited board presidents and executive officers to a series of informal meetings, which produced a formal request to regional agency boards that the group be sanctioned to come up with a plan that could be presented to the legislature. The formal group--one board member and the executive officer from each of the Bay Area's seven major regional agencies--first met in December 1974. Three meetings that month were devoted to trying to reach an agreement that would affect Knox's bill, which he planned to introduce in January 1975.

In December the group unanimously agreed on a plan that would merge ABAG, MTC and BASSA. The agency would have the land use planning powers of the Bay Area Air Pollution Control District and the Regional Water Quality Control Board. The other agencies would remain separate, although there would be a study and report to the legislature in two years on the method of consolidating BCDC into the agency. ABAG's Executive Committee approved the proposal in January 1975, strengthening the section on BCDC by asking for its consolidation within two years.

### The Next Round: AB 625

Assemblyman Knox introduced his bill as planned in January 1975. It conformed almost exactly to what ABAG's Executive Committee had sought, including the mandatory consolidation of BCDC two years after the reconstituted agency was formed. But in early March, Knox informed supporters of the bill that Speaker Leo McCarthy was pressing him to include a directly elected regional executive, which--when the plan was publicly announced--promptly was dubbed by the newspapers as a "super mayor."



AB 625 was approved by the Assembly on a 41-28 vote in the Assembly on April 24, 1975. ABAG and other groups, however, decided to oppose McCarthy's amendments. They could not support the bill so long as the so-called "super mayor" amendments remained in the bill. McCarthy and Knox were persuaded. In August the amendments were removed. Knox also put BCDC into the study category. That agency would not automatically be transferred to the new agency, but would require a later vote of the legislature.

In August and September some Senators sponsored amendments providing for a referendum on the formation of the new agency. The bill passed the Senate but the Assembly at Knox's request refused to adopt the Senate version.

The move sent the bill to a conference committee, where the bill's supporters were sure they could get the initial referendum removed. However, it also became clear that the votes were not available in the Senate for the Assembly version if it were reported by the conference committee. State Office of Planning and Research Director Preble Stolz suggested a compromise. The agency would be created, and would acquire a new power -- the ability to order compliance with the regional plan -- if the voters approved the regional plan. The idea appealed to all the supporters of the bill, and was agreed to by the conference committee and the Assembly itself. But in September the Senate killed the bill on a 13-21 vote. The fact that the bill did not provide for a directly elected governing board influenced some Senators to vote against the measure, while others did not like what they called a "hokey" compromise on the question of agency powers.

### The Demise of BASSA

The 1972 amendments to the Federal Water Pollution Control Act specified minimum levels of sewage treatment for all of the nation's wastewater plants. Congress also provided most of the funding (75 percent) for new or upgraded facilities. . Twenty-four such projects have been completed in the Bay Area at a cost of more than \$60 million. Another 87 projects, with costs estimated at more than \$2 billion, are in various stages of planning or construction. By late 1975, the Federal law was fulfilling most of the implementation role originally envisioned for BASSA.

The State Water Resources Control Board in May 1975 designated ABAG as the areawide waste treatment management planning agency under Section 208 of the 1972 Federal law. In June 1975 the Environmental Protection Agency awarded ABAG a \$4.3 million grant to develop an integrated air and water quality and solid waste management plan for most of the territory of the nine counties. BASSA's general manager resigned shortly thereafter, and several county conferences of mayors and boards of supervisors suggested that BASSA contract with ABAG for staff services. One board of supervisors recommended the two agencies be merged.

Assemblyman John Knox, principal author of the original BASSA law, and Senator Alfred Alquist introduced a merger bill (AB 3041) in January 1976. When the merger bill apparently was stalled, Senator Milton Marks sought to repeal the law, thus abolishing BASSA. Knox and Alquist agreed reluctantly to amend their bill, adding Marks as a coauthor. Despite vigorous lobbying, the new bill was approved by the legislature and governor, and BASSA was abolished January 1, 1977.



## ORGANIZATIONAL ISSUES IN REGIONAL ENVIRONMENTAL MANAGEMENT

In the six decades that areawide agencies have operated in environmental management, a number of critical organizational issues have been raised. Many of them were central to the debates on legislation proposing to merge existing regional planning agencies. They more than likely will be raised again in forthcoming discussions on organizing the continuing planning process for the environmental management program. These issues are described as follows:

### 1. What is a "regional" problem?

Most legislative proposals did not do a very good job of defining the difference between a "local" problem and a "regional" one. The goals and objectives of AB 625 were carefully drafted over a number of months by the Assembly Local Government Committee staff and a number of other groups. In the judgment of many it is the best description of regional problems that any legislative proposal has used. The text of that section is as follows:

**66101.5. The Legislature hereby declares that the regional plan required by Article 7 (commencing with Section 66190) of this chapter shall have the following goals and objectives:**

- (1) With respect to air and water quality:**
  - (a) To achieve and maintain the quality of air at a level which will not impair public health, safety or well-being;**
  - (b) To achieve and maintain the quality of water at those levels which are necessary for appropriate water-related recreational activities and which are necessary to protect the natural habitat of various water-related animal and vegetative species; to enhance other beneficial uses of water; and wherever feasible, to assure the reclamation of waste water;**
  - (c) To achieve the objectives of paragraphs (a) and (b) by specifying reasonable and necessary constraints for activities which, directly or indirectly, have an adverse affect on air and water quality, such as direct emissions and discharges, inappropriate land uses, and inappropriate transportation routes, modes and facilities;**
- (2) With respect to solid waste:**
  - (a) To achieve the use, reuse and recovery of resources found in solid waste in a coordinated, efficient manner;**
  - (b) To identify the most beneficial and most efficient means of disposing of the balance of the region's solid waste;**

(c) To identify the most appropriate sites for disposal of toxic and hazardous substances which cannot be used, reused or recovered, and to assure the adequacy of such sites as to volume and security for their use in perpetuity;

(3) With respect to transportation:

(a) To facilitate the movement of people and goods within the region;

(b) To identify and provide for persons who have special transportation needs due to age, income, physical condition or other factors;

(c) To promote and provide for the most efficient integration of public and private transportation facilities;

(d) To provide for an integrated system of public and private transportation that compliments and supports the goals and policies of the land use element of the regional plan;

(e) To minimize the amount of air pollution, water pollution, noise pollution and other environmental degradation caused by various transportation modes and facilities;

(f) To minimize the amount of land devoted to transportation uses;

(g) To minimize the consumption of energy resources related to transportation;

(h) To assure that transportation systems and facilities are designed for minimum disruption and dislocation of developed communities and neighborhoods;

(4) With respect to land use, to identify and provide for the following three regionally significant types of land uses:

(a) Lands and waters which are to be protected from inappropriate or detrimental uses such as limited, fragile or extraordinary bays, estuaries, swamps, marshes, shorelines and coastlines, streams, aquifer recharge areas, rivers, meadows, flood plains, woodlands, steep slopes, visually prominent and undeveloped ridges or hilltops, rare animal or vegetative habitats, and recreational areas;

(b) Areas which are to be reserved for the production of food or fiber; provided that the reservation of such areas has been made a matter of national, state or regional policy, and provided further that alternative areas are available for the various urban land uses required by the region;

(c) All remaining areas within the region which have not been identified pursuant to paragraph (a) or (b).

Such areas, because they do not need to be protected from inappropriate or detrimental uses as provided in paragraph (a) and do not need to be reserved for the production of food and fiber as provided in paragraph (b), may be appropriate for urbanization and for the variety of land uses associated with and required by urbanization. In order that the urbanization of such areas may be achieved in an orderly manner and to the maximum benefit of the region as a whole and the residents thereof, the lands within such areas shall be further identified as follows:

- (i) Lands which are appropriate and necessary for current urbanization and urban land uses;
- (ii) Lands which will be appropriate and necessary for urbanization and urban land uses in the short-term future; and
- (iii) Lands which will be appropriate and necessary for urbanization and urban land uses in the long-term future.

In identifying such lands, the plan shall further determine and provide for the amount, distribution and general location of lands which are especially suited for urban land uses of regional significance. Areas suitable for use for industrial purposes, for commercial purposes, for recreational and park purposes, for residential purposes and for open space purposes, including open space which guides and shapes developed areas may be of regional significance.

The following policies shall guide the agency in designating such areas:

- (i) Urban land uses should occur within existing urbanized areas or in areas identified by the agency as appropriate for urbanization,
- (ii) Urban land uses should not occur in areas identified in paragraphs (a) and (b) of this subdivision,
- (iii) Urban land uses should enhance the economic vitality and fiscal integrity of local agencies,
- (iv) Urban land uses should provide for maximum efficiency in capital expenditures for, and in operating expenditures connected with, such areawide services and utilities as potable water, natural gas, electricity, telephone, public transportation, highways and roadways, storm drainage, sewage collection and treatment,
- (v) Urban land uses should comply with applicable policies and requirements established by the State Energy Resources Conservation and Development



Commission pursuant to the provisions of Division 15 (commencing with Section 25000) of the Public Resources Code,

(vi) Urban land uses should minimize reliance on the automobile,

(vii) Urban land uses should minimize the length of home-to-work trips resulting from unbalanced distribution of types of jobs and types of homes,

(viii) Urban land uses should minimize potential damage from floods, earthquakes, landslides, forest fires and other natural disasters,

(ix) Urban land uses should provide adequate and appropriate areas for facilities which are required to satisfy the regional needs of commerce, industry, education, health and welfare (such as electric generating and transmission facilities, petroleum refining and storage facilities, industrial facilities, port facilities, airport facilities, medical centers, major educational institutions, and shopping and commercial centers),

(x) Urban land uses should avoid destruction of scenic attributes of the region,

(xi) Urban land uses should avoid destruction of specific sites which have significant regional importance for specific scientific, educational, historic, cultural or scenic purposes,

(xii) Urban land uses should minimize environmental degradation,

(xiii) Urban land uses, insofar as possible, should separate urbanized areas and encourage self-identification and integrity of communities;

(5) With respect to resources, to develop policies for the management, development and use of the natural resources of the region in a manner which minimizes their depletion and, wherever possible, creates conditions for restoring them to their greatest feasible naturally productive capacity.

## 2. What could be the boundaries of an environmental management agency or agencies?

As early as 1949, the nine counties with shoreline on San Francisco Bay were recognized as a unit for regional planning purposes. The State Senate by resolution provided "...that the nine counties be recognized by all California State governmental agencies as an integrated area with common economic, social, and often administrative interest; and further that all California State governmental agencies

supporting and publishing statistical and other data on an area basis support and publish totals for the nine county Bay Area...."

That early mandate does not have the force of law. State departments in the pursuit of their own separate activities have created approximately 120 sets of districts ranging in size from a single county to 30 counties. Most of these districting systems are drawn for internal administrative purposes and don't substantially affect regional planning or environmental management. Thirty-four states have designated sub-state regional planning areas, and 10 more are in the process of establishing such sub-state districting systems. Unlike those states, California has 14 sets of boundaries for major regional planning purposes, including air and water quality, transportation, the ocean coastline, criminal justice, manpower, and economic development and social concerns.

There is no uniform agreement on what is considered the "Bay Area." The nine counties are included in three air basins and four water basins. In both cases, county lines are not respected. The four Bay Area coastal counties are included in two separate regional coastal commissions. The Metropolitan Transportation Commission is responsible for transportation planning in all nine Bay Area counties, although the California Department of Transportation District 4 covers a different set of counties (Solano is excluded and Santa Cruz is included).

Another aspect of the boundary question is whether authority should be defined--as it is with BCDC and the coastal commissions--by geographical features as opposed to local government boundaries such as county lines.

In the political setting, the question of boundaries will be very important because certain northern counties have traditionally argued that they are sufficiently different from the more urbanized counties that they should be excluded from Bay Area planning and regulatory agencies. This concern was a factor in the defeat of several of Assemblyman Knox's regional planning agency bills.

### 3. How much involvement could voters have in any revision of the present system of planning and management?

The key question for some people is how much direct participation citizens should have in changing the present system. The public voted to create the coastal commissions and several smaller special districts, but have not directly participated in the creation of other nine-county agencies.

Many people have argued that any new agency should be established by the voters through referendum, while others have concluded that the responsibility of any restructuring should be the legislature's, since it created most existing regional agencies.

#### 4. What could be the composition of the governing board?

This question is actually two questions: What could the size of the governing body be, and how much participation could local elected officials have on such a body?

##### Participation by local elected officials

Among local elected officials and many citizen groups, there has been substantial agreement during the past few years on this composition for any permanent regional planning agency board: half directly elected and half local government appointed. Despite a willingness on the part of many proponents of either direct election or 100 percent appointment by local government, the issue remains critical.

Some legislators continue to press for an agency board that is entirely directly elected. They insist that an agency board that includes any local officials will be unworkable for a variety of reasons.

Among the statutory agencies, BCDC and MTC have mixed governing bodies--some appointees of local agencies and some Federal and State appointees. The coastal commissions have similar mixed forms of representation. Special districts (with the exception of the Golden Gate Bridge, Highway and Transportation District) are directly elected. The bridge district board is appointed by local governments.

##### Size of the governing board

Several legislators indicated one reason they voted against AB 625 (and similar bills) was that the proposed governing body of 50 members was too large and therefore would have been staff dominated. The board of any agency must be large enough to include representatives of local governments and other diverse interests in a region of almost five million people covering 7,000 square miles. Too small a body would not allow adequate representation of minority interests, and too large a body would be unwieldy. The exact number of governing body members for a nine-county agency appears not to be a critical factor.

#### 5. How permanent could an agency be?

Most existing agencies were established on a permanent basis. Only in the case of BCDC and the coastal commissions were agencies established for an interim period. If new or combined agencies are proposed as a result of the environmental management plan, the question of permanence should be addressed.

#### 6. How could an agency be funded?

Regulatory agencies of the State are funded through the State's



budget process--with most of the revenues from the State income tax. MTC is financed primarily through State subventions from gasoline sales tax revenues and through Federal grants. ABAG is financed through funds contributed by member cities and counties, and through Federal and State grants. The property transfer tax was proposed to finance a comprehensive Bay Area planning agency since most of that proposed agency's work would have been directly related to land uses and urban development issues. Permit fees and user charges could be used to finance environmental management planning.

#### 7. What functions could be performed by an agency or agencies?

Most functions performed by existing agencies fall into three categories: planning, service delivery and regulation. As discussed previously, service delivery agencies preceded regulatory agencies, and planning agencies followed those. Only recently--with the creation of BCDC and the coastal commissions--have planning and regulatory functions been combined to a high degree. The planning functions of the Regional Water Quality Control Board and the BAAPCD have been less directly linked to the permit activity than with BCDC and the coastal commissions. One reason for this is that the air and water quality planning tends to be linked to the permit process through standards rather than designated land uses (as is the case with BCDC and the coastal commissions).

There seem to be two options: (1) taking the planning functions performed by existing agencies and combining all of them into a single planning agency, or (2) combining the environmental management planning responsibilities into a single agency.

#### 8. What could be the implementation powers of an environmental management agency?

Permits are the standard implementation device for existing agencies. Permits are used to implement the basin plan of the Regional Water Quality Control Board, and permits are issued by the BAAPCD, BCDC and the coastal commissions. MTC's implementation authority is primarily through allocation of grant funds to local agencies and large transit districts.

In the legislative debates on AB 2040 and AB 625--bills combining existing agencies--the only new implementation device was the cease-and-desist authority that would have been given to the Bay Area Planning Agency under specified conditions. Most of the powers that would have been exercised by a combined agency already exist, except that ABAG lacks effective means of ensuring that local governments, other agencies and private industry will follow the objectives of the regional plan. Some legislators are of the opinion that unless cease-and-desist powers are included, a combined agency would lack effective

tools to implement its policies. Others say that if local plans are required to be consistent with the regional plan, no specific cease-and-desist powers are necessary. The AB 625 compromise provided that if the Bay Area voters approved the regional plan, the Bay Area Planning Agency would have acquired cease-and-desist powers.

## SOURCES

The literature on Bay Area regional institutions is extensive. The sources listed below are the most useful. In addition to these materials, we have used the ABAG staff legislative files to describe the legislative history of AB 2040, AB 625 and AB 3041.

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## PROJECTIONS INFORMATION





## ABAG'S SERIES 3 PROJECTIONS

ABAG's revised Series 3 Base Case 1 projections of population, housing and employment for the nine-county San Francisco Bay Region are summarized in Tables I-III. The revised projections resulted from a regionwide review of the Provisional Series 3 projections released on March 2, 1977.

The revised projections incorporated both technical and policy feedback from governmental agencies, ABAG's Projections Technical Advisory Committee, and other organizations and individuals.

The Series 3 projections have been used in a number of ABAG's planning programs, including: housing, environmental management, and joint transportation studies with MTC. The revised projections used in the plan integration phase of the Draft Environmental Management Plan superseded the Provisional Series 3 projections. The "compact growth" land use policies tested as part of the Air Quality Maintenance Plan are not included in the revised Series 3 projections described in this section.

The Series 3 projections have resulted from a major local and regional cooperative effort led by ABAG. Information about local policies regarding development or non-development was collected from all counties, most cities, and key special districts. This 1976 Local Development Policy Survey contributes important ingredients to the sub-regional projections. However, an important clarification is in order regarding the term "local policies." The local policies incorporated are primarily those specified to accommodate residential, commercial, and industrial land uses. Local population targets or limits are not represented except as they might be indirectly expressed through housing development potential or sewage treatment plant capacities. Furthermore, after 1985, the local policies are assumed to change to accommodate the projected regional population range to the year 2000. Changes were required because the developable land specified in local regulations was not sufficient to accommodate the projected population.

A range of Series 3 projections was developed for analysis and planning purposes. The two projections are termed Base Case 1 (BC1) and Base Case 2 (BC2). Base Case 1 is the higher of the two projections at the regional level. The guiding concepts behind these two Base Cases are: (1) a plausible range of regional demographic and economic trends; and (2) current operating policies of local-service-providing and regulatory agencies. The projections are not ABAG policy and should not be interpreted as a recommendation for a particular level or distribution of urban development. They are intended to provide information concerning a range of future conditions, and are for problem identification and the development of regional policies. Projections require constant monitoring and are subject to revision as policies and economic and demographic conditions change.

The higher projection, or Base Case 1, is the primary projection used in the development of regional plans at this time, including the Environmental Management Plan. Sub-regional projections by sewerage units are

shown in the Water Quality Technical Memorandum 30 in Appendix B of the EMP documents. Projections are also available for other subareas of the region through ABAG. As projections are applied at smaller and smaller geographic areas, they become less reliable representations of localized conditions. ABAG and city or county planning departments should be consulted about localized conditions when using these small area projections.

To maintain consistency across all regional planning programs and projects, the total regional range of projections will be maintained until the next regular regionwide update. It is recognized that for specialized regional or sub-regional applications new information which affects the projections may be appropriate, particularly if significant policies or trends have changed or corrections in the data base are needed. For this reason, users of the regional projections are encouraged to consult with ABAG.

ABAG's Regional Planning Committee oversees the development and application of projections. On June 7, 1978 the committee adopted Guidelines for Use of Series 3 Projections. The major purposes of the guidelines are:

- A. To describe the general assumptions which underline Series 3
- B. To indicate the limitations of the projections
- C. To describe the use of the projections in regional planning programs
- D. To explain the procedure for incorporating and disseminating new information which affects the projections

The guidelines were also approved by the Work Program and Coordination Committee (WPCC), acting for the Executive Board, on June 15, 1978. Users are encouraged to follow the guidelines and to consult with ABAG when applying the projections.

A resolution to the Governor's Office of Planning and Research (OPR) regarding the appropriate use of ABAG's Series 3 population projections in State programs was also approved by the WPCC. The resolution, included in this volume following the guidelines, indicates that the Series 3 Base Case 1 projections are the most current and consistent projections available for the region. These projections should be used in State programs until such time as significant modifications or updates, judged by the Regional Planning Committee to be consistent with ABAG's regional planning programs, are forwarded to OPR for approval and use. The resolution also requests OPR to notify ABAG of all agencies using the projections and to consult with ABAG on a regular basis.

TABLE I  
SERIES 3 BASE CASE 1 PROJECTIONS  
TOTAL POPULATION  
(000's)

COUNTIES	1975	1990	2000
ALAMEDA	1,089.9	1,199.0	1,284.1
CONTRA COSTA	582.8	768.3	800.0
MARIN	216.1	277.3	292.4
NAPA	90.0	90.3	102.0
SAN FRANCISCO	672.6	643.3	664.6
SAN MATEO	576.4	668.2	804.6
SANTA CLARA	1,169.7	1,389.5	1,465.3
SOLANO	186.3	263.1	323.0
SONOMA	245.4	326.4	415.4
TOTAL REGION	4,829.2	5,625.4	6,151.3

TABLE II  
SERIES 3 BASE CASE 1 PROJECTIONS  
OCCUPIED HOUSING UNITS  
(000's)

COUNTIES	1975	1990	2000
ALAMEDA	396.6	504.3	561.1
CONTRA COSTA	201.7	301.5	318.3
MARIN	79.2	106.8	112.1
NAPA	32.6	36.8	41.2
SAN FRANCISCO	299.3	319.1	336.7
SAN MATEO	208.1	273.6	351.1
SANTA CLARA	392.4	542.6	593.0
SOLANO	62.3	105.0	130.9
SONOMA	89.0	133.7	169.0
TOTAL REGION	1,761.4	2,323.5	2,613.4

TABLE III  
SERIES 3 BASE CASE 1 PROJECTIONS  
TOTAL EMPLOYMENT  
(000's)

COUNTIES	1975	1990	2000
ALAMEDA	435.5	526.4	553.1
CONTRA COSTA	160.5	209.2	228.5
MARIN	54.9	65.1	68.9
NAPA	29.5	35.8	40.5
SAN FRANCISCO	496.8	603.3	624.2
SAN MATEO	225.8	273.2	292.2
SANTA CLARA	507.9	749.6	826.2
SOLANO	51.7	72.1	85.3
SONOMA	77.5	117.7	141.3
TOTAL REGION	2,040.0	2,652.4	2,860.1



## GUIDELINES FOR THE USE OF SERIES 3 PROJECTIONS\*

### I. What are the Series 3 Projections?

The Series 3 projections are the third in a series produced by the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC) since 1970. They estimate the growth and distribution of population, housing, employment, and land use in the San Francisco Bay Region. The Series 3 projections are presented for the nine county region, through the year 2000 at both the regional and subarea level. They are available for each five-year projection interval from 1975 to 2000.

The Series 3 projections constitute a comprehensive set of regional growth estimates and are approved by ABAG's Regional Planning Committee (RPC) for use in all ABAG regional planning programs. They are also recommended by the RPC for use in other multi-jurisdictional planning programs and projects. The subregional projections account for the land development and service policies of local jurisdictions regionwide, but are not represented to be the policy of any given local jurisdiction. They were developed in cooperation with cities, counties, and special districts and with the advice of a projections technical advisory committee. However, ABAG accepts responsibility for the projections. They have undergone one year of review and comment, including workshops within each county.

The Series 3 projections cover a range of future conditions. The two sets of projections are termed "Base Case 1" and "Base Case 2." Base Case 1 represents a higher plausible growth future, while Base Case 2 represents an equally probable lower growth future. The projection range accounts for uncertainties in demographic and economic trends.

Before using the projections, the user should be aware of their underlying assumptions and limitations. As they are used at a smaller and smaller geographic scale, they become less reliable representations of localized conditions, and may need to be supplemented with new information.

Users are strongly encouraged to consult with ABAG and appropriate local agencies before applying the projections, particularly for grant applications.

### II. What is the Purpose of the Guidelines?

- A. To describe the general assumptions which underlie Series 3.
- B. To indicate limitations of the projections.
- C. To describe the use of the projections in regional planning programs.
- D. To explain the procedure for incorporating and disseminating new information which affects the projections.

\*Adopted by the Regional Planning Committee at  
the June 7, 1978 meeting.

### III. Guidelines for the Use of the Series 3 Projections

#### A. General Assumptions that Underlie Series 3:

1. At the regional level, alternative sets of plausible assumptions are made regarding national and regional demographic and economic trends.
2. Transportation assumptions about future highway and transit facilities are based on the Metropolitan Transportation Commission's Regional Transportation Plan.
3. At the subregional level, the projections account for the local land development and service provision policies of cities, counties and special districts in 1975.
4. The projections assume the 1975 local policies as interpreted by ABAG and county staffs in the ABAG Local Development Policy Survey. Users should note that changes in policy, or their interpretation, will be accommodated as new information becomes available (see Section IIID).
5. Rather than being a summation of local area projections, Series 3 reflects the interplay of economic and population growth among local jurisdictions regionwide.

#### B. Limitations for use of Series 3 Projections

Agencies of individuals using the Series 3 projections in work programs or projects outside the context of ABAG's regional programs or ABAG's inter-agency joint work programs should be aware of limitations to such use. ABAG should be consulted regarding consistency of methods used in the application, or new information affecting the projections.

Specific limitations that should be recognized by all independent users of the Series 3 Projections are:

1. The projections are not policy targets or goals. They should not be interpreted as a recommendation for a particular level or distribution of urban development. They are intended to provide information concerning a range of future conditions that is likely to result from current policies and anticipated future regional growth.
2. As projections are extended further into the future, the possibility of divergence from known trends and current policies is greater.
3. As the projections are applied at a smaller and smaller geographic scale, they become less reliable representations of localized conditions. ABAG and city or county planning departments should be consulted about localized conditions which may affect the projections for sub-county areas.

4. As significant changes in trends or policies occur, the projections will be updated. Individual users of the projections can benefit themselves and other users by informing ABAG of significant new information arising from their own review or application of the Series 3 projections.

#### C. The Role of Projections in Regional Planning Programs

1. Series 3 constitutes a comprehensive set of projections now used in all of ABAG's regional planning programs, joint studies and review of plans and projects. ABAG's Regional Planning Committee is responsible for reviewing and approving the use of these projections and overseeing their consistent application.
2. All other agencies engaged in regional planning or development projects of regional scale should consider Series 3 to be the most current and consistent projections available for the region. Organizations intending to coordinate their planning programs with the growth and development assumptions underlying regional plans for transportation, housing, health, water quality, air quality, and solid waste should seek ABAG assistance in the use of the Series 3 projections.
3. The projections provide a range of future growth or urban activities. Neither the higher (Base Case 1) nor the lower (Base Case 2) part of the range is endorsed *a priori*. Specific applications depend on the issues involved and other regional and local policies in effect.
4. The projections alone are not policy targets or goals. They are used to identify regional problems, needs, and issues and to formulate and evaluate regional policies.

#### D. Incorporating New Information Which Affects the Projections

It is recognized that for specialized regional or subregional applications new information which affects the projections may be appropriate, particularly if significant policies or trends have changed or corrections in the data base are needed. The following procedure, which is intended to maintain case by case flexibility, is applicable:

##### 1. Role of the ABAG Regional Planning Committee

The ABAG Regional Planning Committee (RPC) will oversee the use of the Series 3 projections in all regional planning programs. This role includes the consideration of new information arising from experience by users of Series 3 in their application of the projections which may have significant effect on other uses of the Series 3 projections.



RPC will consider such new information on a regular basis to determine:

- whether such information is of significance to the specialized application of the projections in a limited subregional area only;
- whether such information may have immediate significance for other uses of the projections in a limited subregional area;
- whether such information has regionwide significance and is appropriate to the next regular regionwide update of the projections.

## 2. Regionwide Consistency

To maintain consistency across all regional planning programs and projects, the total regional range of projections will be maintained until the next regular regionwide update.

## 3. Subregional Applications

The current Series 3 projections will be used at the subregional level in regional planning programs. However, it is recognized that the smaller the geographic level of application the more specialized local information may be needed to supplement the projections and the assumptions behind them. When new or additional information is available, related to the projections and assumptions, ABAG will consult with appropriate agencies and make the necessary modifications under the guidance of RPC.

## 4. Dissemination of New Information to Users of the Series 3 Projections

ABAG will establish a program to make new information available to users of the Series 3 projections on a regular basis. The projections will be reviewed at least once a year to assess the need for a regionwide update. Updating of the projections will be scheduled consistent with ABAG's annual Regional Plan amendment process.

## 5. Assistance to Users of the Series 3 Projections

All users of the Series 3 projections are urged to seek ABAG assistance in their application of the Series 3 projections. Such ABAG assistance will have two primary objectives:

- a. Determine that the user's technical methods in applying the projections are consistent with the assumptions underlying the projections and with other applications within the region.
- b. Make the user aware of new information affecting the projections.

RESOLUTION NO. 2-78

RESOLUTION TO OPR REGARDING THE  
APPROPRIATE USE OF ABAG'S SERIES 3 POPULATION  
PROJECTIONS IN STATE PROGRAMS

WHEREAS, the Series 3 projections were developed in cooperation with cities, counties, and special districts and with the advice of a projections technical advisory committee; and

WHEREAS, Series 3 projects the growth and distribution of population, housing, employment, and land use throughout the San Francisco Bay region; and

WHEREAS, Series 3 constitutes a comprehensive set of projections now in use in ABAG's regional planning programs, joint studies, and review of plans and projects; and

WHEREAS, the projections alone are not policy targets or goals, but are used to identify regional problems, needs, and issues to formulate regional policies; and

WHEREAS, the development of projections at ABAG is an ongoing process, and

WHEREAS, as significant changes in trends or policies occur, the projections will need to be updated; and

WHEREAS, as projections are extended farther into the future, the possibility of divergence from known trends and current policies is greater; and

WHEREAS, as projections are applied at a smaller and smaller geographic scale, they become less reliable representations of localized conditions; and

WHEREAS, ABAG and city or county planning departments should be consulted about localized conditions which may affect the projections for subregional areas; and

WHEREAS, the Series 3 projections provide a range of future growth of urban activities in which the higher projection is called Base Case 1 and the lower projection is called Base Case 2; and

WHEREAS, the higher projection or Base Case 1 is the primary projection used in the development of regional plans, including the Environmental Management Plan; and

WHEREAS, a set of guidelines have been developed for the use of the Series 3 projections; and

WHEREAS, ABAG's Regional Planning Committee is responsible for reviewing and approving the use of these projections and overseeing their consistent applications,

BE IT RESOLVED that the Executive Board request that the State Office of Planning and Research (OPR) consider the Series 3 Projections to be the most current and consistent projections available for the region;

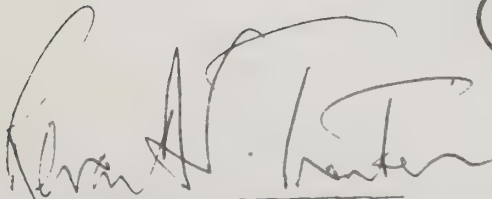
AND BE IT FURTHER RESOLVED that for the purpose of regional consistency, the higher projection, or Series 3 Base Case 1, should be approved for use in State programs;

AND BE IT FURTHER RESOLVED that OPR accept the current Series 3 Base Case 1 projections for use by the State until such time as significant modifications or updates, judged by the Regional Planning Committee to be consistent with ABAG's regional planning programs, are forwarded for approval and use by OPR;

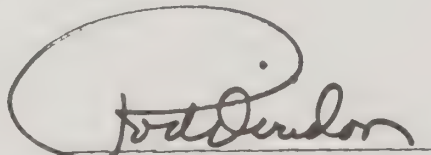
AND BE IT FURTHER RESOLVED that OPR shall notify ABAG in writing when any State agency makes use of the Series 3 projections;

AND BE IT FURTHER RESOLVED that OPR instruct all appropriate State agencies that these projections not be used without consulting with ABAG and appropriate local agencies on a regular basis and that the use of the projections be consistent with ABAG's Guidelines for Use of the Series 3 Projections.

The foregoing resolution was passed by the Work Program and Coordination Committee, acting for the Executive Board, this 15th day of June, 1978.



Ryan A. F. Tranter  
Executive Director



Rod Diridon  
President





PART 3

ASSESSMENT MATERIALS





This section describes the assessment process used for the environmental management planning program. Additional detail is described in the Environmental Impact Report chapter of Volume II.



SURFACE RUNOFF ASSESSMENT  
PROCEDURES MANUAL

ENVIRONMENTAL MANAGEMENT PLAN  
FOR THE SAN FRANCISCO BAY REGION

May 1977

This publication was financed in part by a grant from the Environmental Protection Agency under Section 208 of the Federal Water Pollution Control Act Amendments of 1972.



## PREFACE

Federal and State statutes and regulations require impact assessment. Section 208(b)(2)(E) of the Federal Water Pollution Control Act Amendments of 1972 states that any plan prepared pursuant to that section must include "the identification of...the economic, social and environmental impacts of carrying out the plan..." The EPA Guidelines for State and Areawide Water Quality Management Program Development emphasize the integration of assessment into plan development rather than writing an after-the-fact assessment.

The Environmental Management Plan will also consider air and solid waste problems. Other environmental legislation influencing the EMP includes but is not limited to--the Clean Air Act Amendments, the Solid Waste Management and Resource Recovery Act, the National Environmental Policy Act and the California Environmental Quality Act.

The Environmental Management Plan will be developed by identifying the environmental, economic, institutional, financial and social impacts of alternative solutions to our air, water and solid waste problems and weighing these factors in deciding upon the preferred alternatives. This approach requires that assessment be an integral part of plan development. This planning effort distinguishes between assessment and evaluation. Assessment develops information about the potential impacts of alternative management plans and programs. Evaluation is the use of that information by decision-makers to judge, select and adopt the preferred alternative/plan.

This manual describes how assessment will be used in development of the county surface runoff management programs. It provides guidance on how to do assessment and how to present the impact information to the public and decision-makers. It is written for the county lead agencies who will be preparing the county surface runoff management programs. The same assessment approaches and tools will be used by ABAG staff to aggregate the county plans into a Surface Runoff Management Plan.

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## WHY DO ASSESSMENT

Impact assessment provides information on the environmental, economic, social, institutional and financial effects of plans, programs and projects. Experience shows that developing a plan and writing an after-the-fact EIR often results in identifying impacts that jeopardize plan implementation or require costly reengineering and replanning. A more efficient and meaningful approach to plan development integrates assessment and planning. Such an approach allows the weighing of environmental, economic and social benefits and costs of alternative solutions to our air, water and solid waste problems. Integrated assessment and planning is the approach that has been adopted for development of the Environmental Management Plan.

Integrated assessment and planning contributes to the Environmental Management Program goal of producing a plan that:

- o will lead to the greatest possible improvement in water and air quality and problems caused by solid waste, and will lead to compliance with federal and state standards and objectives at the earliest possible date
- o will not have social, economic or environmental effects so unacceptable as to prevent implementation

Assessment and evaluation of both adverse and beneficial impacts of alternatives is critical to the success of the Environmental Management Program. This planning effort distinguishes between assessment and evaluation.

- o Assessment concentrates on developing information about the potential impacts of alternative plans.
- o Evaluation involves the use of that impact information by decision-makers in judging, selecting and adopting the plan(s).

Integration of assessment into the development of the Surface Runoff Management Plan is the policy of the Environmental Management Task Force. On February 9, 1977, the EMTF adopted the following approach for development of the Surface Runoff Management Plan:

1. Determine all the reasonable possibilities for controlling pollution from surface runoff. (Candidate control measures.)
2. Identify the factors that should be considered in deciding whether a control is appropriate. (Assessment Checklist adopted by EMTF November 10, 1976.)
3. Decide in general what problems are being caused by surface runoff; that is, what pollutants are being discharged, how much, where, generally what are their effect, what is the source of the pollutants, etc. The analysis should give strong consideration to possible effects on the Bay.

4. Based on the problem analysis and using the Assessment Checklist, refine the list of candidate control measures. Develop alternative management programs. Analyze the programs with respect to the Assessment Checklist.

Refine and reanalyze the programs. Continue this process until a set of reasonable alternatives has been developed.

5. Develop regional alternatives and assess these with respect to the Assessment Checklist.
6. Evaluate and select among the alternatives, balancing environmental, social, and economic effects with specific consideration to alternative funding sources.
7. Assume in this process that conclusions drawn in 1977 are tentative and that there must be a continuing process of data collection and evaluation.

#### WHY A MANUAL

This manual is one aid for use in the control measure analysis process outlined in Number 4 of the EMTF adopted policy for development of the Surface Runoff Management Plan. The manual has the following objectives:

- o to describe how assessment is integrated into surface runoff management planning
- o to provide guidance on how to do assessment
- o to assure the use of consistent methods and data in assessment
- o to produce comparable impact information for evaluation by decision-makers

A guidance manual leads or directs a course of action. Such a manual has two important qualities:

1. It can be used by all eight counties and by ABAG staff.
2. It allows consideration of situations that may be unique to a county or to the region.

#### WHAT TOOLS HAVE BEEN PROVIDED

This section of the manual describes the "tools" chosen to be used in assessment. These tools integrate assessment and planning and thus do not add more steps or work to the task of developing county and regional surface runoff management alternatives. Each tool will be described using examples where necessary to clarify how it works. The next section of this chapter will explain how to do assessment using these tools.

The first tool is the Assessment Checklist (see appendix). The Checklist, developed with the aid of public input, displays factors considered important in assessment and evaluation of pollution control measures. Organized into four broad categories--Environmental, Institutional and Financial, Economic and Social--the Checklist indicates the potential types of impacts that might be associated with environmental control measures.

The Checklist shows a full range of effects that might be associated with control measures and alternative plans. However, not every factor will be used to assess every control measure or alternative plan. Assessment will identify the most relevant and meaningful impact information.

The second tool is the Surface Runoff Control Measure Assessment Matrix (see Figure 1). It lists the candidate control measures (column) and the sixteen subcategories of the Assessment Checklist (row). One purpose of the matrix is to indicate a potential cause-effect relationship between a control measure and the assessment subcategories. The relationship may result in an adverse or beneficial impact. For example, a control measure requiring additional amounts of open space in and around residential developments to absorb storm water runoff may have adverse effects on housing supply and cost of new housing but may also have beneficial impacts of enhanced visual amenities, increased recreation potential, as well as reducing runoff volume and pollutant loadings.

Another important purpose of this matrix is to provide a screening mechanism. The matrix rankings indicate where there is no identifiable link between a control measure and an assessment subcategory or the nature or potential level of impact. The matrix focuses impact prediction on appropriate assessment factors. The rankings indicate the degree of effort or depth of analysis required to predict the impacts of the control measure.

The rankings which appear on the matrix and their definitions are:

- A = direct, substantial, immediate and significant impact; requires quantitative analysis if possible
- B = direct or indirect impact that might be significant; requires quantitative analysis if possible to determine if impact is significant
- C = indirect impact that is marginal, minor; qualitative discussion is required
- = no significant relationship; no detailed discussion required

Examples using these definitions in ranking a control measure's potential impact on an assessment subcategory should clarify the matrix.

An "A" ranking appears for every control measure's impact on the "Water Quality" subcategory. This ranking indicates that a direct measurable effect is expected.



SURFACE RUNOFF CONTROL MEASURE ASSESSMENT MATRIX

	<u>Air</u> <u>Qual-</u> <u>ity</u>	<u>Water</u> <u>Qual-</u> <u>ity</u>	<u>Physical</u> <u>Resources</u>	<u>Energy</u>	<u>Amen-</u> <u>ities</u>	<u>Institu-</u> <u>tional</u>	<u>Finan-</u> <u>cial</u>	<u>Prod. of</u> <u>goods</u> <u>services</u>	<u>Income/</u> <u>Invest.</u>	<u>Con-</u> <u>sumer</u> <u>Expend.</u>	<u>Hous-</u> <u>ing</u> <u>Supply</u>	<u>Physi-</u> <u>cal</u> <u>Mobil-</u> <u>ity</u>	<u>Health/</u> <u>Safety</u>	<u>Sense</u> <u>of</u> <u>Commu-</u> <u>nity</u>	<u>Urban</u> <u>Pattern/</u> <u>Landuse</u>	<u>Equity</u>
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I. Prevent Contaminants from Reaching the Surface

Control chemicals	C	A	B	-	C	A	B	A	A	B	-	-	B	-	-	C
Control dumping & direct discharge	C	A	C	C	B	A	B	B	C	B	-	-	C	B	-	-
Control littering & dogs	C	A	C	-	B	B	B	B	B	B	-	-	B	B	-	C
Control auto and other emissions	A	A	C	A	B	A	B	B	B	B	B	A	B	B	B	A

II. Improve Methods of Collecting or Reducing Contaminant Erosion Prior to Rainstorm

Street cleaning	B	A	C	C	B	B	A	C	C	C	-	B	B	B	-	-
Clean storm drain system	C	A	C	C	B	C	B	C	-	-	-	-	C	-	-	-
Regrade disturbed areas	C	A	B	-	B	B	B	C	-	-	C	-	B	C	-	-
Reseed or apply veg. cover to bare slopes	-	A	A	C	A	B	B	C	-	-	C	-	B	C	-	-
Control erosion at construction sites	C	A	C	-	C	B	C	C	C	C	C	-	C	-	-	C
Regulate construction schedules	C	A	C	-	C	B	B	C	C	C	B	-	C	-	B	C
Use efficient tillage and plowing practices	C	A	B	C	C	B	C	C	C	C	-	-	B	-	-	C
Insure proper operation of septic tanks	B	A	C	C	C	C	B	C	C	C	C	-	B	C	B	B

III. Reduce Volume and Peak of Storm Water Runoff

Develop slope density standards	C	A	C	C	B	C	B	C	C	C	C	-	B	C	B	-
Maintain open space	C	A	A	C	A	B	A	C	C	C	B	C	C	C	B	C
Control development patterns	B	A	B	C	C	B	B	C	C	C	B	C	C	C	A	C
Develop buffer strip requirements near streams	-	A	B	-	C	C	C	-	C	-	C	-	C	C	C	-
Develop recreation-al retention basins	-	A	A	-	B	B	B	C	-	C	C	-	C	C	-	-

SURFACE RUNOFF CONTROL MEASURE ASSESSMENT MATRIX

	<u>Air</u> <u>Qual-</u> <u>ity</u>	<u>Water</u> <u>Qual-</u> <u>ity</u>	<u>Physical</u> <u>Resources</u>	<u>Energy</u>	<u>Amen-</u> <u>ities</u>	<u>Institu-</u> <u>tional</u>	<u>Finan-</u> <u>cial</u>	<u>Prod. of</u> <u>goods</u> <u>services</u>	<u>Income/</u> <u>Invest.</u>	<u>Con-</u> <u>sumer</u> <u>Expend.</u>	<u>Hous-</u> <u>ing</u> <u>Supply</u>	<u>Physi-</u> <u>cal</u> <u>Mobil-</u> <u>ity</u>	<u>Health/</u> <u>Safety</u>	<u>Sense</u> <u>of</u> <u>Comm-</u> <u>nity</u>	<u>Urban</u> <u>Pattern/</u> <u>Landuse</u>	<u>Equity</u>
<u>III. Reduce Volume and Peak of Storm Water Runoff</u>																
Control roof drains	-	A	-	-	-	B	C	C	-	C	C	-	-	-	-	-
Construct detention & storage basins	C	A	C	C	C	A	A	-	C	C	C	-	B	C	-	C
Increase perviousness of surfaces	-	A	-	-	C	B	B	C	C	C	C	C	B	-	-	-
Require minimum amount of pervious surface for new construction	-	A	B	-	B	B	B	C	C	C	B	-	B	C	C	C
Modify drainage basin	-	A	B	-	B	B	B	B	C	C	-	C	B	-	C	-
Stabilize and redesign channels	C	A	B	-	B	C	B	C	-	-	-	C	B	-	-	-
Remove debris in channels, pipes and inlets to improve flow	C	A	C	-	B	C	B	C	C	C	C	-	B	C	-	-
<u>IV. Redirect, Detain and Treat Runoff Prior to Discharge</u>																
Replace cross connections	-	A	-	-	C	B	A	C	-	-	-	C	C	-	-	-
Rechannel runoff to prevent flow over critical areas	C	A	A	-	B	B	A	C	-	-	C	-	B	-	-	-
Redesign curb and gutter	C	A	C	-	C	B	A	C	C	C	C	C	B	C	-	C
Trap sediments and solids by use of catch basins	C	A	C	-	C	B	A	C	-	-	-	-	B	-	-	-
Impound runoff in upstream channels	-	A	B	-	C	B	A	C	-	-	C	-	B	C	-	-
Construct on-line & off-line storage	C	A	C	A	C	B	A	C	C	-	-	-	C	-	-	-
Construct treatment facilities	C	A	B	A	C	B	A	C	C	-	C	-	C	-	C	C
Use existing collection and treatment facilities	-	A	C	A	C	B	A	C	-	-	-	-	C	-	C	-

A "B" ranking appears for the impact of "Control Chemicals" on the "Physical Resources" subcategory. Control of certain chemicals could have a direct impact on agricultural production activities. However, the ability to quantify the impact on crop productivity depends on the importance of the chemical to the production of the particular crop(s).

The impact of "Street Sweeping" on "Physical Resources" is rated "C". In this instance, physical resource impacts could occur but would probably be second or third order effects. For example, more street sweeping could result in more solids deposition in sanitary landfills. This could ultimately affect capacities in existing landfills. If that results in the need for new landfill sites, physical resources could be impacted, for example, through landfill siting on or adjacent to agricultural lands or mineral bearing lands.

The above street sweeping impact example illustrates that many of the impacts rated "C" will often be impossible to quantify. Assigning numbers to essentially subjective judgments is misleading. Moreover, as the causal links between control measures and impacts on assessment factors become more numerous, and the influence of additional factors increases, the ability to determine a measurable impact is reduced. Often, in such cases, the nature of the impact may only be qualitatively inferred.

The Surface Runoff Control Measure Assessment Matrix guided development of another tool, Assessment Procedure. Forty-five procedures appear in Chapters 2-6. Each chapter corresponds to the four major categories of the Assessment Checklist-Environmental Criteria, Institutional and Financial Criteria, Economic Criteria and Social Criteria. Each procedure provides an approach for identifying the nature and extent of the impact. The procedures correspond to the 16 subcategories or the specific assessment factors which appear under each of the subcategories.

Figure 2 is an example of an assessment procedure. Note that each procedure is divided into three sections:

Background

- This section discusses the importance of the assessment factor. It may also briefly discuss the nature of impacts that are of most concern. An example of a specific control measure's potential impact on the assessment factor appears set off from the background statements.

Impact Questions

- Using a checklist approach again, this section guides the impact prediction and measurement through a series of questions. The questions identify the kinds of impacts that a control measure might have on the assessment factor.

Information Sources

- This section supplements the impact questions section. The sources range from agency contacts such as the California Department of Parks and Recreation to printed material such as maps, plans, special studies and environmental impact documents. These sources provide a data base or more detailed information to identify impacts.



## Physical Resources

### Effect on critical land resources

- o Impact on prime or unique agricultural lands
- o Impact on other agricultural lands

### Background:

Bay area agricultural lands produce important food commodities, dairy products and specialty crops. Control measures may impact agricultural lands by affecting the physical supply of land in production and uniquely suited for certain types of production or by affecting agricultural activities. Either of these types of impacts may occur as a direct result of implementation of a control measure or as an indirect result of a control measure's effect on development patterns.

Example - Control measures which consume land (detention basins, treatment facilities, impoundments) could impact the supply of agricultural land if implemented on or adjacent to such lands.

- Channel alteration could affect agricultural drainage systems.
- Control of chemicals could impact crop fields where chemicals controlled are an important part of the production function.

### Impact Questions:

Would control measures have an impact on:

#### A. The Resource Base - The Land

1. prime agricultural lands (Class I and II lands classified by the SCS land use capability classifications and land rated 80-100 in the Storie Index Rating)?\*
2. other agricultural lands (Class III-IV lands as classified by SCS land capability classifications; grazing and marginal agricultural lands)?
3. lands in agricultural preservation zones?
4. lands currently producing or in appropriate micro-climate for production of unique or specialty crops a high percentage of which is grown in the region (e.g., wine grapes, brussel sprouts)?
5. lands which support or are capable of supporting livestock for production of food and fiber and with an annual carrying capacity of one animal per unit?
6. lands currently producing or capable of producing fruit or nut bearing trees, vines, bushes, crops with a nonbearing period of less than five years with a normal net return (during commercial bearing period on an annual basis from production of unprocessed agricultural plant production) not less than \$200 (1975 dollars) per acre?

7. land which has returned from the production of unprocessed agricultural plant products an annual gross value of not less than \$200 per acre for 3 of previous 5 years.

## B. The Activities - The Use of the Land

1. production activities associated with the particular nature of the agricultural enterprise (e.g., tilling, soil enrichment, product waste disposal)?\*
2. environmental characteristics/conditions necessary to the agricultural activity or which might affect crop viability (e.g., changes in air quality, water quality and supply, climate conditions)?\*

### Information Sources:

Resource Conservation District, Agricultural Extension Service, Soil Conservation Service, County Assessor's Offices (information on acreage assessed as agricultural land), Calif. Dept. of Agriculture - Crop and Livestock Reporting Services (Annual Reports), County Planning Departments. U.S. Dept. of Commerce, "Census of Agriculture", County Data Part 48, California, Sec. 2, Vol. 1, Area Reports; "Prime and Unique Agricultural Lands in the Bay Area", SCS 1970; "Soil Capability for Agriculture", ABAG 1969; "Agricultural Resources Study", ABAG 1969; MAPS - Agricultural Land Use in: Santa Clara Co. (1968), San Mateo Co. (1968), Napa Co. (1968), Marin Co. (1968), Alameda Co. (68), Solano (68), Sonoma (68) - all by County Agricultural Extension Service; Agricultural Preserves (maps): Santa Clara County - Public Works Dept. 1968, San Mateo County - Planning Dept. 1967, 1970, Napa County - Planning Dept. 1970, Marin County - Planning Dept. 1968, 1970, 1974, Contra Costa County - Planning Dept. 1970, Alameda County - Planning Dept. 1968, 1970, 1974; Map of Prime Agricultural Lands - Wallace, McHarg, Roberts, Todd for Metropolitan Transportation Commission; Maps - Office of Planning and Research 1973 - Prime Agricultural Lands-Gross Income more than \$200/acre/yr., Potentially Prime Agricultural Lands, SCS Class I and II lands; "San Mateo Coast Corridor Evaluation", ABAG, 1975; "Regional Coastline Plan", ABAG 1973; Final Report, Part A - Task 1 The Region Described as an Interacting System, Natural Process Inventory, Wallace, McHarg, Roberts & Todd for Metropolitan Transportation Commission p.96-106; "Effects of Air Pollution on Vegetation", Air Pollution Vol. 1, Academic Press N.Y. 1968; "Effects of Air Pollution on Plants" in Air Pollution Handbook McGraw-Hill, N.Y. 1956; "Economic Impact of Air Pollutants on Plants in the United States", Stanford Research Institute 1972; "Relative Sensitivity of Plants to Major Air Pollutants", prepared by Center for Air Environment Studies, Pennsylvania State University, 1971.

\*Where consumption or conversion of lands currently in agricultural production may occur, where production activities may be impacted or crop viability threatened discuss the economic effects using procedures in the Economic Criteria Chapter.

The networking of impacts is another tool which is incorporated into the assessment procedure. Networking identifies secondary impacts. Notice the asterick after several of the impact questions of the sample procedure (Figure 2). The note at the bottom of the page explains the asterisks. In this case, should agricultural production decrease due to conversion of such land to other uses, due to changes in environmental conditions or controls on production input (such as fertilizers or herbicides) there would be economic effects. The economic effects could range from changes in profits and prices of goods to effects on wages. The Economic procedures in Chapter 4 would explain how to assess those impacts.

The last tool provided is an Assessment Worksheet (see Figure 3). The format of the worksheet follows that of the impact questions. The worksheet will be used in conjunction with the impact questions and information sources to assess the control measures. They aid the sequential approach to detailed impact identification. First, the work sheets are filled out for a particular control measure. Thereafter, each time that a control measure is packaged into an alternative plan, much of the assessment information for the detailed assessment is already available. The worksheet "synopsis" of impacts will be useful in preparation of the graphic summary assessment information. It eases the job of assessing impacts of alternative programs because the impacts of the control measures in that alternative are already known. This makes the job of identifying additive, cumulative or synergistic, and antagonistic impacts that much easier.

#### HOW DO YOU USE THE TOOLS

Assume that we have refined the list of candidate control measures as indicated in number 4 of the EMTF policy for development of the Surface Runoff Management Plan. Assume that "control chemicals" is a candidate control measure on that refined list. How do we identify the environmental institutional, financial, economic and social impacts of this control measure and any subsequent management program that might incorporate it?

Looking at the Surface Runoff Control Measure Assessment Matrix (Figure 1), note that the impact rankings associated with "control chemicals" range from "A" significant to "C" marginal or minor with several "-" or no significant relationship rankings. The rankings indicate the potential nature and extent of the expected impact on the assessment category of controlling chemicals.

Supplemental information will refine the candidate control measures and provide more detailed cost and effectiveness data. However, we currently know that several water quality problems are associated with nutrient loadings in water bodies. One recognized man-made source of nutrients is the inorganic nitrogen fertilizers used extensively in agricultural production. Therefore, for the purposes of this illustration, assume that the refined control measure is "control the use of nitrogen fertilizers/reduce use by 25% in agricultural areas."



# ASSESSMENT WORKSHEET

Answer the following questions by checking the appropriate box(es); consider the activity, construction, operation, and other indirect impacts.

CONTROL MEASURE \_\_\_\_\_

ASSESSMENT FACTOR Physical Resources - Prime, Unique, Other Agricultural Lands

WOULD THE CONTROL MEASURE HAVE AN IMPACT ON PRIME, UNIQUE OR OTHER AGRICULTURAL LANDS OR PRODUCTION ACTIVITIES? \_\_\_\_\_ YES \_\_\_\_\_ NO Sources/Reason \_\_\_\_\_

If YES, specify the nature of impacts on:

	Direct	Indirect	Minor	Moderate	Severe	Reversible	Irreversible	Quantifiable	Qualitative	Adverse	Beneficial
prime agricultural lands? Source(s) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
other agricultural lands? Source(s) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
lands in agricultural preservation zones? Source(s) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
lands producing/capable of producing unique/speciality crops? Source(s) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
lands supporting/capable of supporting livestock? Source(s) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
lands producing or capable of producing fruit or nut bearing trees, vines, bushes, crops? Source(s) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Source(s) \_\_\_\_\_

Source(s) \_\_\_\_\_

<input type="checkbox"/>	Direct
<input type="checkbox"/>	Indirect
<input type="checkbox"/>	Minor
<input type="checkbox"/>	Moderate
<input type="checkbox"/>	Severe
<input type="checkbox"/>	Reversible
<input type="checkbox"/>	Irreversible
<input type="checkbox"/>	Quantifiable
<input type="checkbox"/>	Qualitative
<input type="checkbox"/>	Adverse
<input type="checkbox"/>	Beneficial

Source(s) \_\_\_\_\_

Source(s) \_\_\_\_\_

□ □ □ □ □ □ □ □ □ □

Source(s) \_\_\_\_\_

Source(s) \_\_\_\_\_

[illegible]

### Explanation/Notes

Again referring to the Surface Runoff Control Measure Assessment Matrix and specifically to the ranking for the Physical Resources subcategory, we note a "B" ranking. Reaching for a set of worksheets (see example in Figure 3) for Physical Resources and turning to the Environmental Criteria Assessment Procedures Chapter in this manual, we can begin the first level of the detailed assessment of the control measure.

Beginning with the Air Quality - Federal and State standards worksheet, we would use a worksheet in conjunction with each assessment procedure in the Chapter to initially assess the potential effects of the control measure. To better illustrate, refer to Figures 2 and 3 and we'll do an assessment.

The Background statement of the example assessment procedure indicates the importance of Bay Area agricultural lands. One example of a control measure which might affect agricultural lands is in fact "control chemicals". Looking at the worksheet, we would write in the control measure space the exact wording of the refined control measure. Moving down the page, the answer to the first question is "yes." To specify the impacts, we must know where agricultural lands are located, the type of agricultural lands (prime etc.) and the crops grown on the lands. Using maps from the Information Sources to substantiate and expand our personal knowledge, we note that such a control will affect prime agricultural lands. In this hypothetical case, those prime agricultural lands produce a specialty crop, a majority of which is grown in the Bay region. The latter point is again verified by looking in one of the sources listed in the Information Sources--Annual Crop Reports of the California Department of Agriculture Crop and Livestock Reporting Office. We note the specific information at the bottom of the page using the Explanation/Notes area of the worksheet. We should also note that the major impact will be on the production activities as we will be altering an input factor--fertilizer--which is essential to production of the specialty crop. That we know from calling the Cooperative (Agricultural) Extension Service. The staff verified that nitrogen addition is especially important because of the use of artificial soil as a growing medium for this crop. The completed worksheet might then look something like Figure 4 and we would note the necessity to determine the economic effects of the impacts on agricultural production using the economic assessment procedures in Chapter 5.

Having worksheets filled out for the assessment factors (some of which may look like Figure 5), makes the job of assessing the overall impacts of alternative programs much simpler. Assuming that this control measure might be included in three alternative programs, much of the alternative assessment work is already done. This would allow us to concentrate on the cumulative impacts, for example, of the three, five, or whatever number of control measures which might be packaged into one alternative.

#### THEN WHAT DO YOU DO

The impact information for the alternative management programs will be presented in two forms. There will be a graphic summary of findings. The format of this chart is currently being developed with the aid of several



## ASSESSMENT WORKSHEET

Answer the following questions by checking the appropriate box(es); consider the activity, construction, operation, and other indirect impacts.

CONTROL MEASURE Control the use of nitrogen fertilizers/reduce use by 25%

ASSESSMENT FACTOR Physical Resources - Prime, Unique, Other Agricultural Lands

WOULD THE CONTROL MEASURE HAVE AN IMPACT ON PRIME, UNIQUE OR OTHER AGRICULTURAL LANDS OR PRODUCTION ACTIVITIES? X YES        NO Sources/Reason Prime and Unique Agri-

cultural Lands in the Bay Area, Agricultural Land Use in        County

If YES, specify the nature of impacts on:

	Direct	Indirect	Minor	Moderate	Severe	Reversible	Irreversible	Quantifiable	Qualitative	Adverse	Beneficial
prime agricultural lands?											
Source(s) <u>Prime and Unique Agricultural</u>											
<u>Lands in the Bay Area (SCS)</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
other agricultural lands?											
Source(s) <u>Map of Agricultural Land Use in</u>											
<u>County</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
lands in agricultural preservation zones?											
Source(s) <u>Map of Agricultural Preserves</u>											
<u>      </u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
lands producing/capable of producing unique/speciality crops?											
Source(s) <u>Crop and Livestock Reporting</u>											
<u>Service Annual Report, Extension Service</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
lands supporting/capable of supporting livestock?											
Source(s) <u>      </u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>      </u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
lands producing or capable of producing fruit or nut bearing trees, vines, bushes, crops?											
Source(s) <u>      </u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>      </u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

lands which have returned from production of unprocessed plant products an annual gross value of > \$200/acre for 3 of previous 5 years?

Source(s) Crop and Livestock Reporting

Service Annual Report, Extension Service

production activities associated with the particular enterprise (Specify)

Source(s) Extension Service

environmental conditions/characteristics necessary to the agricultural activity or which might affect crop viability?

Source(s) \_\_\_\_\_

Direct	Indirect	Minor	Moderate	Severe	Reversible	Irreversible	Quantifiable	Qualitative	Adverse	Beneficial
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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#### Explanation/Notes

A majority of the agricultural lands in the county are prime agricultural lands (Class I and II), in agricultural preserves. The main crop produced on those lands is a specialty crop which in 1976 returned (annual gross value) \$200/acre and has done so for the last three years. The major impact will be on the production process as nitrogen fertilizer is a particularly important input factor. Due to the artificial growing medium used, a reduction of 25% will affect the crop output. The Extension Service agent noted that the production impact will vary as a function of farm size. The production impact should be estimated using the Economic Procedure -- Production of Goods and Services.

# ASSESSMENT WORKSHEET

Answer the following questions by checking the appropriate box(es); consider the activity, construction, operation, and other indirect impacts.

CONTROL MEASURE Control Roof Drains - Direct Flow onto Pervious Surfaces

ASSESSMENT FACTOR Effect on energy consumption/demand; conservation/supply

WOULD THE CONTROL MEASURE HAVE AN IMPACT ON ENERGY CONSUMPTION/DEMAND OR ON ENERGY CONSERVATION/SUPPLY? YES xx NO Sources/Reason Involves only

redirecting roof drain pipes onto pervious surfaces. Little if any equipment is required (labor only). Only energy to make pipes is involved.

If YES, specify the nature of impacts on:	Direct	Indirect	Minor	Moderate	Severe	Reversible	Irreversible	Quantifiable	Qualitative	Adverse	Beneficial
energy consumption/demand Source(s) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
energy conservation/supply Source(s) _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
efficiency in use of energy Source(s) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
energy use during peak hours Source(s) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
energy use during off peak hours Source(s) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
solar energy production Source(s) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
resource recovery, recycling, energy production as a by-product of residuals management (See Solid Waste Procedure)											

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EXPLANATION/NOTES



advisory and policy committees of the EMTF. The summary might use a matrix format. The summary form will be useful for impact presentations to the public, to EMTF committees, and to EMTF.

The second form will be a detailed report as called for in the county contracts. The exact form of this detailed report is also under consideration by ABAG staff and various committees at this time. This report, whatever the format, will fully document the assessment work that led to the alternative management programs. It will provide backup documentation for the graphic summary of impact information. It will be an important tool for the development of the Surface Runoff Management Plan and subsequently for development of the Environmental Management Plan.

## CHAPTER 2

### ENVIRONMENTAL CRITERIA PROCEDURES





Physical Resources, Energy and Amenities Assessment Summary Table

<u>Criteria</u>	<u>Potential Impacts</u>	<u>Information Needs</u>	<u>Method</u>	<u>Findings*</u>
Flora and fauna	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o affect rare and/or endangered species of plants or animals or their habitats?</li> <li>o affect desirable, beneficial or unusual species and/or habitat area?</li> <li>o alter ecosystem processes vital to species and/or habitat area?</li> <li>o affect natural functions performed by species and their habitats?</li> </ul>	<p>Rare and endangered species lists - locations and habitat type locations</p> <p>Species/habitats identified as desirable, beneficial, or unusual.</p> <p>Vital processes and functions of species and habitats located near or on implementation area.</p>	<p>Locate implementation area in relationship to rare and/or endangered species and their habitats or habitat types.</p> <p>Locate same in relationship to desirable, beneficial or unusual species or their habitats.</p> <p>Identify the ecosystem processes which could be changed/alterd by the control measure implementation or effects.</p> <p>Identify functions performed which could be changed/alterd/eliminated by control measure implementation or effects.</p>	<p>Destruction of rare and/or endangered species of plants or animals or their habitats or habitat types.</p> <p>Destruction of desirable, beneficial or usual species of plants and animals or their habitats.</p> <p>Changes/alternations in ecosystem processes.</p> <p>Effects on functions performed by species or habitats.</p>
Prime or unique agricultural lands	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o be implemented on or near prime or unique agricultural lands?</li> <li>o influence development patterns, placing pressure on prime or unique agricultural lands?</li> <li>o affect essential production activities?</li> <li>o affect crop viability/sensitivity?</li> </ul>	<p>Land Capability Classification</p> <p>Storie Index</p> <p>Carrying Capacity</p> <p>Annual per acre production</p> <p>Crop Sensitivity</p>	<p>Locate prime and unique agricultural lands.</p> <p>Identify production activities which could be affected. Identify crop sensitivity to control measure characteristics/effects.</p>	<p>Consumption of prime or unique agricultural lands</p> <p>Potential for impact on essential activities</p> <p>Potential for changed environmental conditions to impact productivity</p>
Other agricultural lands	Same	Same	Same	Same
Mines, quarries and mineral bearing lands	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o be implemented on or near mineral bearing lands or extraction activity areas?</li> <li>o affect future access to such lands?</li> <li>o affect continuation of extraction activities?</li> </ul>	<p>Location, type and quantity of deposits</p>	<p>Locate implementation area in relationship to desopits &amp; extraction activities.</p> <p>Identify extraction activites which could be affected.</p>	<p>Consumption of lands containing valuable mineral resources.</p> <p>Impact on continuation or expansion of extrac-tion activities.</p>

Timber-producing and other forested lands	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o be implemented on or near forests with commercial value or of regional significance?</li> <li>o affect production/harvesting activities?</li> <li>o affect current/future use of forests as wildlife habitat, recreation, scientific or educational environment?</li> </ul>	Location, size & species of forested lands. Current and planned use of resource	<p>Locate implementation area in relationship to forested lands. Identify production activities which could be affected. Identify species sensitivity to control measure characteristics/effects. Identify uses which could be changed.</p>	Consumption of forested lands. Impact on future access to and productivity of forested lands. Impacts on viability of species. Impacts on uses of forested lands.
Salt ponds	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o be implemented on or near salt ponds?</li> <li>o affect current or future extraction activities?</li> </ul>	Location of salt ponds	<p>Locate implementation area in relationship to salt ponds. Identify extraction activities which could be affected.</p>	Consumption or future pre-emption of extraction activity areas. Changes in extraction activities
Geothermal sites	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o be implemented on or near geothermal areas?</li> <li>o affect future access to or exploitation of geothermal areas?</li> </ul>	Location of geothermal sites	<p>Locate implementation area in relationship to geothermal sites. Identify effects on energy production activities.</p>	Consumption or future pre-emption of exploitation of geothermal sites. Impacts on activities necessary for energy production.
Lands uniquely suited for seaport, airport, marina or energy site development	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o be implemented on or adjacent to sites/areas proposed for such uses?</li> <li>o influence development for other uses on sites/areas proposed for such uses?</li> <li>o impair future access to or development for such purpose?</li> </ul>	<p>Location of existing seaports, airports, marinas, or energy facilities. Proposed expansion of existing facilities. Future sites for such facilities</p>	<p>Locate area of control measure implementation and influence in relationship to existing &amp; proposed seaports, airports, marinas, or energy facilities</p>	<p>Consumption of lands planned for future use as seaports, airports, marinas, energy facilities. Impacts on access to/use of sites proposed for such uses</p>
Recreation sites	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o be implemented near existing recreation areas?</li> <li>o be implemented on or near proposed recreation areas?</li> <li>o result in siting of incompatible land use on or adjacent to sites proposed for development as recreation areas?</li> <li>o affect the use of or access to existing or proposed recreation areas?</li> </ul>	Location of existing & proposed recreation areas	<p>Locate area of control measure implementation and influence in relationship to existing &amp; proposed recreation areas. Identify control measure effects which could impact use of or access to recreation areas.</p>	Consumption of lands planned for future use as recreation areas. Influence on development patterns potential for pre-emption of areas planned as recreation areas.

Solid Waste	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o affect solid waste generation?</li> <li>o affect storage practices?</li> <li>o affect collection and transportation?</li> <li>o affect reuse proposals?</li> <li>o affect disposal sites and practices?</li> </ul>	<p>Type of waste produced by the control measure or by its effects.</p> <p>Location of landfill sites (current and future)</p>	<p>Identify control measure effects on components of the waste management stream and activities necessary for each part. Identify implementation area in relation to landfill sites.</p>	<p>Impacts on components of the waste management stream. Impacts on cost and/or efficiency of any component. Impacts on current and/or future landfill sites and need for landfilling.</p>
Energy	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o affect energy consumption/demand?</li> <li>o affect energy conservation/supply?</li> </ul>	<p>Energy requirements of the control measure or effects of the control measure (development influences).</p>	<p>Identify the characteristics of the control measure which require energy, contribute to conservation, efficiency, use of alternative sources.</p>	<p>Impacts on energy use patterns-demand and supply. Impact on efficiency and alternative sources.</p>
Visual Amenities	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o affect the coastal viewshed?</li> <li>o affect highly scenic areas?</li> <li>o affect open areas which provide contrast to urbanization or preserve natural landforms?</li> <li>o affect the visual quality of of an area by affecting visibility?</li> </ul>	<p>Areas of scenic importance.</p>	<p>Locate implementation area in relationship to scenic area. Identify control measures effects which could impair/enhance the scenic significance/visual quality.</p>	<p>Adverse/beneficial effects on areas of scenic importance and/or on visibility.</p>
Historic & Cultural Resources	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o be implemented on or near historic or cultural resources?</li> <li>o affect access to historic or cultural resources for educational, scientific, tourism purposes or community cultural affairs?</li> </ul>	<p>Location of properties on the <u>National Register</u>, historic properties maintained by the Calif. Dept. of Parks and Recreation, zoned historic districts. Historic and cultural resources for educational, scientific or tourism purposes or for community activities.</p>	<p>Locate implementation area in relationship to historic and/or cultural resources. Identify control measure characteristics/effects which could affect access to or use of the resource(s).</p>	<p>Consumption of historic or cultural resource areas. Impact on access to or use of the resource(s).</p>
Noise	<p>Will control measure(s):</p> <ul style="list-style-type: none"> <li>o affect the ambient noise level in the area of implementation?</li> </ul>	<p>Noise levels associated with the control measure or associated effects. Adjacent land use and noise levels. Existing noise standards, community noise programs.</p>	<p>Locate implementation area, noise effects of control measure and change in ambient noise levels. Identify local programs and standards in effect.</p>	<p>Change in ambient noise levels, duration, area of impact, mitigation measures.</p>

\*Findings are the product of assessment - the statement of the control measure's expected impact on the resource.



## Air Quality

- o Federal and State standards

### Background:

The air quality impacts created by surface runoff control measures can be described in three categories: 1) decreased dust (particulate matter) due to measures to reduce erosion, 2) increased dust during construction of public or private facilities to detain or treat surface runoff, and 3) decreased dust removed by street sweepers. One type of air quality assessment of surface runoff management plans will be conducted with methods not described below. Measures concerned with control of auto emission and development patterns will be assessed with methods developed for the air quality maintenance plan.

Example - A new sediment basin will require 3 acres of heavy construction operations. Using the emission factor provided for heavy construction operations of 2400 pounds per acre per month of construction, the new facility, requiring one month to complete, will create 7200 pounds of suspended dust emissions. The size and volume of dust created will then indicate the amount of mitigation required. For example, a comparatively large volume of dust would require frequent watering during grading periods, particularly if located in a windy area or near such "sensitive receptors" as schools, hospitals, or parks.

- Street sweepers will remove some dust particles that make up part of the particulate matter. It is generally considered that particulate matter is composed of particles 10 microns or less in diameter. Assuming 1) 2% of the total amount of particles in the street are less than 10 microns and 2) street sweepers can remove about 10% of these sized particles, then street sweeping a commercial street having 290 lbs./curb mile would achieve a reduction of .58 lbs. per curb/mile. This amount would no longer be susceptible to being blown into the air. (See Water Pollution Aspects of Street Surface Contaminants, Sartor and Boyd)

### Impact Questions:

1. Will the implementation of a control measure result in the increase or decrease of dust? Describe examples of how much dust may be reduced or created due to the use of the measure. Describe methods of decreasing dust created by the control measure.

### Information Source:

Compilation of Air Pollution Emission Factors, Section Edition, Part B, U.S.E.P.A., 1976. See appendix, use agricultural tilling for the above category #1; use heavy construction operation for #1 and #2 categories.

Various publications discussing build up of dust and dirt in the Control Measures Workshop binder also give figures for determining reduction of dust by street sweepers.



## Air Quality

### Other air quality considerations

#### o Odor

#### Background:

Odors are generally thought of as distracting or annoying qualities of the physical environment. Odors elicit reactions due to their perceived effect on a neighborhood or community as an attractive place to live, work or visit. Control measures may enhance or degrade the existing odor conditions in an area.

Example - A debris and sediment basin that is not maintained can result in water stagnation. Eutrophication can then occur with its resulting odor.

#### Impact Questions:

Would the control measure(s):

##### 1. generate undesirable odors?

Consideration should be given here to treatment facility measures and runoff detention measures and the potential for septicity conditions to generate undesirable odors. The location, intensity and duration of odors generated should be discussed. Note that the Bay Area Air Pollution Control District has established source limitations for any odorous substance in Regulation 2, Division 15.

##### 2. generate or result in conditions which would generate odors that would violate maximum allowable emission concentrations for specific odorous compounds (as established by the Bay Area Air Pollution Control District in Regulation 2, Division 15)?

##### 3. eliminate undesirable odors which might otherwise occur?

Considerations should be given here to flushing and debris removal measures which might eliminate sources of odor.

## Physical Resources

### Effect on flora and fauna

- o Impacts on desirable, unusual, rare or endangered species
- o Impacts on plant species which provide cover and food for important wildlife species
- o Effects on noxious species of plants and animals\*\*
- o Impact on wetlands, marshes, coastal zones and estuaries
- o Impact on wildlife habitat

### Background:

Flora and fauna are generally recognized as important because of their desirability, uniqueness or because certain of their species are recognized as rare and/or endangered. They may also be recognized and distinguished due to the function(s) performed by the species - wildlife habitat, aesthetic, educational functions and physical functions.

Flora and fauna are usually studied in the context of the physical places where they exist - habitats - and the function(s) that they and their habitats perform in the ecosystem (e.g., flood attenuation, groundwater recharge, slope stability). Control measures may impact plant and animal species by affecting the physical supply either by direct destruction or elimination of a species or by destroying habitat areas. Control measures may also alter ecosystem processes (e.g., nutrient production, flow regime alterations) which serve important natural functions and which will in turn affect flora and fauna and their habitats.

Example - Construction of detention basins could destroy rare/endangered/beneficial/desirable/unusual plant species and thereby eliminate wildlife habitat.

- Redesign of stream channels will alter the flow regime of the stream which may affect groundwater recharge and/or drain or alter marshes, wetlands etc.

### Impact Questions:

Would the control measure(s) have an impact on:

#### A. Plant and Animal Species

1. rare and/or endangered species of plants?
2. rare and/or endangered species of animals?

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\*\* Effects on noxious species of plants and animals should be discussed in the section Public Health and Safety - Effect on public health.

3. desirable, beneficial or unusual species of plants (especially plant species which provide food and cover for important wildlife species)?
4. desirable, beneficial or unusual species of animals?

Note that the concern here is with species viability which may be affected by actual physical destruction/elimination of a species through construction related activities and impacts or elimination due to the introduction of competitive species, predator species or chemicals etc., which threaten species viability.

#### B. Plant and Animal Habitats

1. habitats of rare and/or endangered species of plants?
2. habitats of rare and/or endangered species of animals?
3. habitats of beneficial, desirable, or unusual species of plants and/or animals (includes flyways/nesting/breeding and stopover areas of migratory birds)?
4. habitats of other important species of wildlife?

The concern and the patterns of impact are the same as outlined in A above. The effects of habitat destruction will change species abundance, productivity and diversity. Another concern is with control measure impacts on access to habitats and movement patterns (highways) of wildlife in relation to their habitats.

#### C. Ecosystem Processes/Functions

1. natural processes (physical, chemical, biological) which are vital to plant and animal species and/or their habitats?

Concern is with effects on natural succession patterns, the physical dimensions and vital processes of wetlands, marshes, salt ponds, estuaries, woodlands and other habitat areas (e.g., biological activity increases without compensating changes in energy use and nutrient recycling, changes in the use of biological material without changes in the rate of production)

2. natural processes and functions which are performed by the species and/or habitat (e.g., flood and pollution attenuation, groundwater recharge, slope stability etc.)?

Reseeding bare slopes and slope density standards would enhance slope stability. Maintaining open space could allow continuation of flood attenuation and/or groundwater recharge functions.

#### Information Sources:

See appendix for list of rare and endangered species. "Water Quality Control Plan Report, San Francisco Bay Basin", Part 2, State Water Resources Control Board and Regional Water Quality Control Board 1975; California Coastal Plan,



California Coastal Zone Conservation Commission 1975; Protected Waterways Plan, The Resources Agency 1971; "At the Crossroads", Department of Fish and Game; "The Marine Life Refuges and Reserves of California", Department of Fish and Game; "A Historical Review of Fish and Wildlife Resources of the San Francisco Bay Region", Department of Fish and Game, Water Projects Branch, Report No. 1, 1972; "Occurrence of Juvenile Forage and Game Fishes Over the Inter-tidal Mud-flats of the San Francisco Bay Complex", Department of Fish and Game, Anadromous Fisheries Branch, Admin. Report No. 71-2, 1968; "Ecological Studies of the Sacramento-San Joaquin Delta", Department of Fish and Game, D.W. Kelley, Vol. 1, Fish Bulletin 166-Vol. 2. Fish Bulletin 167, 1966; "Natural Resources of Bolinas Lagoon: Their Status and Future", Department of Fish and Game, 1970; "California Seabird Breeding Ground Survey", Department of Fish and Game 1969-70; "Coastal County Fish and Wildlife Resources and their Utilization", Department of Fish and Game 1975; "Fish and Wildlife in the Marine and Coastal Zone", Department of Fish and Game, 1971; Wetlands of the United States, U.S. Department of the Interior Circular No. 39, 1971; American Wildlife and Plants: A Guide to Wildlife Food Habitats, Martin, Zim and Nelson; Birds of Northern California, McCaskie and De Benedictis; Freshwater Fish, Eddy Samuel 1969; "Wildland Soils, Vegetation Activities Affecting Water Quality", Calif. Division of Forestry Final Task Report for the State Water Resources Control Board, Aug. 1972; Tomales Bay Study: Compendium of Reports; "Regional Ocean Coastline Plan", ABAG 1973; "San Mateo Coast Corridor Evaluation", ABAG 1975; "A Plan for the Conservation of Resources" in Santa Clara County General Plan; Nicasio Valley Study; Conservation Elements County General Plans; EIS and EIR.

Additional habitat area maps - "Fish and Game Field Notes", Department of Fish and Game 1974; "Natural Resource Areas", North Central Coast Regional Commission 1974; "Timber Stands", U.S. Department of Agriculture, Forest Service; "Vegetative Cover", California State Soil Service; "Soil-Vegetation Maps", State Division of Forestry; California Native Plant Society; Department of Agronomy and Range Management, Univ. of California at Davis.

\*The effects of control measures on plant and animal species and/or their habitats may affect their functions as a recreational, educational, or scientific resource and amenities. Discuss such effects under Effect on recreation use or potential and Effect on Visual amenities.



## Physical Resources

### Effect on critical land resources

- o Impact on prime or unique agricultural lands
- o Impact on other agricultural lands

### Background:

Bay area agricultural lands produce important food commodities, dairy products and specialty crops. Control measures may impact agricultural lands by affecting the physical supply of land in production and uniquely suited for certain types of production or by affecting agricultural activities. Either of these types of impacts may occur as a direct result of implementation of a control measure or as an indirect result of a control measure's effect on development patterns.

Example - Control measures which consume land (detention basins, treatment facilities, impoundments) could impact the supply of agricultural land if implemented on or adjacent to such lands.

- Channel alteration could affect agricultural drainage systems.
- Control of chemicals could impact crop yields where chemicals controlled are an important part of the production function.

### Impact Questions:

Would control measures have an impact on:

#### A. The Resource Base - The Land

1. prime agricultural lands (Class I and II lands classified by the SCS land use capability classifications and land rated 80-100 in the Storie Index Rating)?\*
2. other agricultural lands (Class III-IV lands as classified by SCS land capability classifications; grazing and marginal agricultural lands)?
3. lands in agricultural preservation zones?
4. lands currently producing or in appropriate micro-climate for production of unique or specialty crops a high percentage of which is grown in the region (e.g., wine grapes, brussel sprouts)?
5. lands which support or are capable of supporting livestock for production of food and fiber and with an annual carrying capacity of one animal per unit?
6. lands currently producing or capable of producing fruit or nut bearing trees, vines, bushes, crops with a nonbearing period of less than five years with a normal net return (during commercial bearing period on an annual basis from production of unprocessed agricultural plant production) not less than \$200 (1975 dollars) per acre?

7. land which has returned from the production of unprocessed agricultural plant products an annual gross value of not less than \$200 per acre for 3 of previous 5 years.

B. The Activities - The Use of the Land

1. production activities associated with the particular nature of the agricultural enterprise (e.g., tilling, soil enrichment, product waste disposal)?
2. environmental characteristics/conditions necessary to the agricultural activity or which might affect crop viability (e.g., changes in air quality, water quality and supply, climate conditions)?

Information Sources:

Resource Conservation and Development District, Agricultural Extension Service, Soil Conservation Service, County Assessor's Offices (information on acreage assessed as agricultural land), Calif. Dept. of Agriculture - Crop and Livestock Reporting Services (Annual Reports), County Planning Departments. U.S. Dept. of Commerce, "Census of Agriculture", County Data Part 48, California, Sec. 2, Vol. 1, Area Reports; "Prime and Unique Agricultural Lands in the Bay Area", SCS 1970; "Soil Capability for Agriculture", ABAG 1969; "Agricultural Resources Study", ABAG 1969; MAPS - Agricultural Land Use in: Santa Clara Co. (1968), San Mateo Co. (1968), Napa Co. (1968), Marin Co. (1968), Alameda Co. (68), Solano (68), Sonoma (68) - all by County Agricultural Extension Service; Agricultural Preserves (maps): Santa Clara County - Public Works Dept. 1968, San Mateo County - Planning Dept. 1967, 1970, Napa County - Planning Dept. 1970, Marin County - Planning Dept. 1968, 1970, 1974, Contra Costa County - Planning Dept. 1970, Alameda County - Planning Dept. 1968, 1970, 1974; Map of Prime Agricultural Lands - Wallace, McHarg, Roberts, Todd for Metropolitan Transportation Commission; Maps - Office of Planning and Research 1973 - Prime Agricultural Lands-Gross Income more than \$200/acre/yr., Potentially Prime Agricultural Lands, SCS Class I and II lands; "San Mateo Coast Corridor Evaluation", ABAG, 1975; "Regional Coastline Plan", ABAG 1973; Final Report, Part A - Task 1 The Region Described as an Interacting System, Natural Process Inventory, Wallace, McHarg, Roberts & Todd for Metropolitan Transportation Commission p.96-106; "Effects of Air Pollution on Vegetation", Air Pollution Vol. 1, Academic Press N.Y. 1968; "Effects of Air Pollution on Plants" in Air Pollution Handbook McGraw-Hill, N.Y. 1956; "Economic Impact of Air Pollutants on Plants in the United States", Stanford Research Institute 1972; "Relative Sensitivity of Plants to Major Air Pollutants", prepared by Center for Air Environment Studies, Pennsylvania State University, 1971.

\*Where consumption or conversion of lands currently in agricultural production may occur, where production activities may be impacted or crop viability threatened discuss the economic effects using procedures in the Economic Criteria Chapter.

## Physical Resources

### Effect on critical land resources

- o Impact on mines, quarries and mineral-bearing lands

#### Background:

The key mineral resources in the Bay Area are sand gravel. They are important for construction activities. Control measures may impact mineral resources by affecting the resource base, lands containing the resources, or by affecting the activities associated with the use of the mineral resources.

Example - Control measures which consume land (detention basins, treatment facilities, impoundments) could impact the supply of mineral bearing land or impair access to the minerals if implemented on or adjacent to such lands.

- Control measures requiring buffer strips along streams and/or trapping sediment in catch basins may affect sand and gravel extraction activities.
- Control measures such as maintain open space and control development patterns may have beneficial impacts where they re-direct development away from mineral bearing lands.

#### Impact Questions:

Would control measures have an impact on:

##### A. The Resource Base - The Land

1. lands or water areas containing valuable minerals such as mercury, sand, gravel, crushed rock, expansible shale, limestone, expansible perlite, volcanic cinder etc?
2. future availability or access to valuable minerals listed above?

##### B. The Activities - The Use of the Resources

1. current extraction activities associated with valuable minerals listed above?
2. future extraction activities associated with use of valuable minerals listed above?

#### Information Sources:

"Water Quality Control Plan Report, San Francisco Bay Basin", Part 2, State Water Resources Control Board and Regional Water Quality Control Board 1975; "Physical Resources Study - San Francisco Bay Area", ABAG 1971; "Geologic Guidebook of the San Francisco Bay Counties", Calif. Division of Mines Bulletin 154, 1951; "mineral Resources of California", Division of Mines and Geology Bulletin 191, 1966; USGS Map - Mineral Resources of the San Francisco Bay Region, California - Present Availability and Planning for the Future;

Map - "Energy and Mineral Resources" by Wallace, McHarg, Roberts & Todd for Metropolitan Transportation Commission; "County Maps Showing Mines and Mineral Deposits" - Div. of Mines and Geology; "Geologic-Economic Mineral Map of California" 1970; Div. of Mines and Geology; California Coastal Plan, Calif. Coastal Zone Conservation Commission 1975.

\*Where control measures would adversely affect lands containing valuable minerals and/or current extraction activities discuss economic effects using procedures in Economic Criteria Chapter.



## Physical Resources

### Effect on critical land resources

- o Impact on timber-producing and other forested lands

### Background:

In addition to providing lumber for construction activities, forested lands also serve as a scenic resource, wildlife habitat, and recreation, scientific and education environments. Control measures may impact timber-producing and other forested lands by affecting the resource base or by affecting the activities associated with the use of the land or resources.

Example - Control measures which consume land (e.g. detention basins, treatment facilities impoundments) could impact the supply of the resource - forested lands - if implemented on or adjacent to such areas.

- Control measures such as maintain open space could serve to maintain forested lands.
- Required sediment controls could impact harvesting activities by adding new or additional steps and time to harvest the timber.

### Impact Questions:

Would control measures have a potential impact on:

#### A. The Resource Base - The Land

1. land containing stands of any species of trees with current commercial value?
2. lands containing stands of any species of trees which have clear potential for or are planned for harvesting as a result of their commercial value?
3. land containing stands of trees covering an area of five contiguous acres or more or which, because of visibility from public places, forms and important element of a scenic resource or regional landscape?
4. upland woodlots and marginal timber lands?

#### B. The Activities - The Use of the Resources

1. the productivity/viability of species of trees contained in stands of trees covering an area of five contiguous acres or more which, because of visibility from public places, form and element of a scenic resource or regional landscape or with current or clear potential commercial value?

2. production and associated harvesting activities of stands of trees containing species with commercial value?
3. the viability of species of trees and thus their continued use as a recreation, scientific or education environment?

Information Sources:

State Division of Forestry; Pacific Southwest Forest and Range Experiment Station (Berkeley); County Assessor's Offices (information on acreage assessed as forest/timberland as highest and best use); County Planning Departments (Forest Resource Studies and Ordinances); "Native Trees of San Francisco Bay Region" Metclaf, Woodbridge 1970; "Water Quality Control Plan Report, San Francisco Bay Basin", Part 2, State Water Resources Control Board and Regional Water Quality Control Board, 1975; "Wildlands Soils, Vegetation, and Activities Affecting Water Quality", Div. of Forestry, Final Task Report for State Water Resources Control Board, 1972; "Soil-Vegetation Maps" State Div. of Forestry; "Timber Stand and Vegetation Cover Maps", State Div. of Forestry; California Coastal Plan, Calif. Coastal Zone Conservation Commission, 1975; Forest Resources of San Mateo County, 1971 and other Special Studies, EIR, EIS.

\*Where control measures would adversely affect lands with trees of commercial value or harvesting activities necessary to realize the commercial value discuss economic effects using procedures in Economic Criteria Chapter.

\*Where control measures would affect forest stands which are scenic resources, discuss aesthetic impacts using procedures in Amenities and/or Effect on recreational use or potential.

\*Where control measures would affect forest stands which serve as habitat areas for wildlife discuss those impacts in the section on Flora and Fauna.

## Physical Resources

### Effect on critical land resources

- o Impact on salt ponds

#### Background:

Salt ponds produce a commercially valuable commodity. The natural processes which occur in salt ponds are also an important part of the ecosystem. Control measures may impact salt ponds by affecting the resource base or by affecting natural processes or activities associated with saline extraction.

Example - The control measure requiring buffer strips along streams may affect the salt water extraction process.

#### Impact Questions:

Would control measures have an impact on:

1. salt ponds located in the Bay Area?
2. future/continued extraction operations:

#### Information Sources:

"Water Quality Control Plan Report, San Francisco Bay Basin", Part 2, 1975, State Water Resources Control Board and Regional Water Quality Control Board 1975; Map - Energy and Mineral Resources by Wallace, McHarg, Roberts & Todd for Metropolitan Transportation Commission; EIR and EIS documents.

\*Where control measures would adversely affect salt ponds or future/continued extraction activities discuss economic effects using procedures in Economic Criteria Chapter.

## Physical Resources

### Effect on critical land resources

- o Impact on geothermal sites

#### Background:

Geothermal energy is electric power generated by releasing steam from naturally hot areas through drill holes and channeling it to a generator unit. Geothermal energy may prove to be a valuable alternative energy source in those Bay Area counties that have such resources. Control measures may impact the resource base, lands able to produce this form of energy, or the activities associated with extraction or use of the resource base.

Example - Control measures which consume land (detention ponds, treatment facilities, impoundments) could impact the geothermal resource base if implemented on or adjacent to such areas and affect access to and use of the base.

- Control measures which control development patterns may have beneficial impacts where they re-direct development away from geothermal areas.

#### Impact Questions:

Would control measure(s) impact:

##### A. The Resource Base - The Land

1. lands that contain rocks containing water or steam at temperatures from 150°C - 650°C?
2. sites that have been designated for or are currently used for geothermal energy generation?

##### B. The Activities - The Use of the Resource

1. activities necessary to extraction and use of the energy potential?

#### Information Sources:

Map G6-1 Div. of Oil & Gas - The Geysers Geothermal Field & Potential Geothermal Resources Areas; Mineral Resources of California, Div. of Mines & Geology Bulletin 191; Summary of Operators - Oil, Gas & Geothermal Production Statistics 1972 Div. of Oil & Gas; Map - "Energy & Mineral Resources" Wallace, McHarg, Roberts & Todd for Metropolitan Transportation Commission.



## Physical Resources

### Effect on solid waste

#### Background:

Municipal, residential, commercial, industrial and agricultural activities all generate large quantities of solid waste materials. Disposal of solid waste must be accomplished without degradation of the physical environment. Traditionally, waste disposal has been accomplished by transporting the waste material to land areas capable of holding or assimilating the material without adverse effects on land resources, water supplies or adjacent activities. In recent years, satisfactory land locations for waste disposal have become increasingly difficult to locate, especially those for hazardous waste disposal which require specific hydrological and geological conditions. Increasing volumes of solid waste generation have also posed problems for location of satisfactory land disposal sites. Concern with the depletion of natural resources has focused more attention on recycling and reuse of materials which would formerly have been disposed of in landfills. Concern with identification of alternative energy sources has focused attention on the energy recovery potentials of solid waste materials.

Although another management plan - the Solid Waste Management Plan - will specifically address the problems and issues of solid waste, it is necessary to consider the impacts of each management plan on solid waste management. Surface runoff candidate control measures may have varying types of solid waste impacts. Some control measures may reduce the volumes of solid waste (domestic, agricultural, hazardous etc.) or contribute to alternative management programs of recycling and reuse. Other control measures may increase the amount of solid waste (directly or indirectly through effects on development trends). Control measures may affect the availability of land sites for disposal by pre-empting such sites or by contributing to development pressures on or adjacent to potential land disposal sites. Control measures may also impact the activities associated with various solid waste disposal techniques.

Example - A litter control program could include prohibiting the sale of nonreturnable bottles and a recycling program for cans. The impacts of such controls would include: a change in the volume of solid waste generated, a change in the amount of waste disposed of by landfilling and ultimately, if enough communities followed suit, an impact on capacities in existing landfills and the need for additional sites.

- Rechannelling runoff to prevent flow over critical areas could impact landfills by controlling or eliminating a source or contributing factor to leaching problems.

#### Impact Questions:

Would the control measure(s) have an impact on:

##### A. Solid Waste Generation

1. the volume of solid waste generated?
2. the type of solid waste generated?

- B. Solid Waste Storage Practices
  - 1. the volume required for storage?
  - 2. health and safety considerations for storage?
- C. Solid Waste Collection Activities
  - 1. operation of collection systems?
- D. Solid Waste Transportation Practices
  - 1. operation of transportation systems?
- E. Solid Waste Processing/Transfer Activities
  - 1. front end processing activities?
  - 2. back end processing activities (including materials and energy recovery)?
  - 3. transfer station activities?
- F. Reuse
  - 1. the ability of communities to implement reuse programs?
  - 2. any pilot projects or plans for reuse programs proposed by communities or private industries or groups?
- G. Disposal Sites and Practices
  - 1. existing landfill sites?
    - a. capacities?
    - b. management practices?
    - c. by affecting (reduce/increase) the likelihood of development near existing landfills?
  - 2. designated future landfill sites? (see county solid waste management plans)
    - a. by pre-empting those sites for control measure implementation?
    - b. by location adjacent to those sites? (Discuss resultant constraints on the landfill site)
    - c. by affecting (reduce/increase) the likelihood of development on or near future landfill sites?
    - d. management practices, site preparation activities requisite to use of the site for landfill purposes?

3. alternative solid waste disposal activities (e.g., incineration, land application)?

Note that in addition to the identification of the impact per se on any component of the solid waste management system the effects on cost and efficiency should be identified where possible.

Information Sources:

County Health Departments, County Planning Departments, County Public Works Departments, ABAG - Air and Water Quality Management Division and Land Resources Division, State Solid Waste Management Board, State Department of Health, Regional Water Quality Control Board, Bay Area Air Pollution Control District.

"The Bay Area Solid Waste Management Project, Phase I", State Solid Waste Management Board, December 1976; County Solid Waste Management Plans (prepared by each of the nine Bay Area counties in cooperation with their cities); Map in Environmental Management Plan Work Program Summary - "Solid Waste Disposal in the San Francisco Bay Region"; USGS/HUD, San Francisco Bay Region Environment & Resources Planning Study Map MF-430 (1972)."

## Physical Resources

### Effect on land sites with special characteristics

- o Effects on lands uniquely suited for seaport, airport, marina or energy site development

#### Background:

Seaports, airports, marinas and energy facilities play an important role in a region's economy and vitality. Control measures may impact lands uniquely suited for development for those purposes by competing with or preempting sites with such potential. Control measures may also impact the use of sites suited for development for these purposes by affecting the requisite development and/or operation and maintenance activities.

- Example - Control measures which consume land (detention basins, treatment facilities, impoundments) could pre-empt development for such special uses if implemented on/adjacent to proposed sites.
- Requirements for minimum amounts of pervious surface for new construction could affect the usefulness of the site for development as (for example) an airport.

#### Impact Questions:

Would the control measure have an impact on:

##### A. The Base

1. lands uniquely suited for development as a seaport, airport, marina or energy facility?
2. lands proposed for such use in regional or local general plans or by private industry?

##### B. The Activities

1. site preparation activities requisite to development?
2. construction, operation or maintenance activities necessary to use the land for a seaport, airport, marina or energy facility?

#### Information Sources:

Airport Land Use Commissions, County and City Planning Departments, Metropolitan Transportation Commission, Port Authorities, Corps of Engineers.

"Regional Airport System Plan", ABAG, 1972; County Airport Plans, Preliminary - San Francisco Bay Area In-Depth Study - New Facility Analysis, U.S. Army Corps of Engineers-San Francisco 1976; Channels, Ports and Related Facilities Inventory, U.S. Army Corps of Engineers - San Francisco 1973.



## Physical Resources

### Effect on recreation use or potential

- o Impact on actual or potential recreation sites (e.g. parks, beaches, stadia etc.)
- o Impact on recreation use

### Background:

Additional leisure-time and a growing orientation toward the out-of-doors contribute to the steadily increasing demand for recreational opportunities, especially those in and close to urban areas. Control measures may have an impact on recreation resources by affecting the resources base, existing recreation sites, and proposed or potential sites for recreation development. Control measures may also affect activities associated with recreation use.

Example - Control measures such as maintain open space and control development patterns could have beneficial effects on the supply of recreation resources.

- Control measures such as upstream impoundments could reduce the amount of recreation areas/could inundate areas proposed for parks, forests etc.
- Recreational retention basins could impact access to or use of recreation facilities.

### Impact Questions

Would control measures have an impact on:

#### A. The Resource Base - The Land

1. existing or proposed recreation areas such as city, county, regional, state or federal:
  - a. parks
  - b. beaches
  - c. recreation areas or centers
  - d. forests
2. existing or proposed publicly owned recreation facilities such as:
  - a. fairgrounds
  - b. golf courses
  - c. marinas
  - d. stadia
3. other public or privately owned recreation facilities (existing or proposed)?
4. the availability of land that might be suitable for recreation facilities?

B. The Activities - The Use of the Resources

1. the use of recreation facilities or areas (existing or proposed)?
2. access to recreation facilities or areas (existing or proposed)?

Information Sources:

State, County, Regional and City Parks and Recreation Departments; County General Plans Open Space Elements. Outdoor Recreation Outlook to 1980: San Francisco Bay Area Metropolitan Complex, Dept. of Parks & Recreation 1966; California Coastal Plan, California Coastal Zone Conservation Commission, 1975; "California Protected Waterways Plan (Initial Elements)", The Resources Agency, 1971; "Regional Open Space Element", ABAG 1969; "Regional Ocean Coastline Plan", ABAG, 1973; "Marin County Parks & Recreation Plan 1990", Marin County Planning Dept. 1965; "Parks & Open Space: A Program for San Mateo County", Regional Planning Committee, 1968; "BCDC Recreation in and Around San Francisco Bay", BCDC 1968; "San Mateo Coast Corridor Study", ABAG 1975; Regional Parklands Map - Preliminary 1973 East Bay Regional Park District; MAPS: Open Space & Parks 1975 ABAG; Open Space & Ownership - Solano County 1970; Open Space & Public Ownership - San Mateo 1970; Open Space & Ownership - Napa County 1970; Open Space - Marin Co. 1970; Open Space & Ownership Contra Costa Co. 1970; Open Space & Ownership Alameda Co. 1970.

## Energy

- o Effect on energy consumption/demand
- o Effect on energy conservation/supply

### Background:

The effect of plans, programs and products on consumption of scarce resources, especially energy and fuels, is of increasing concern to the public. It is important to identify those aspects of a control measure and alternative management plans which are energy consumptive, or contribute to efficiency in the use of energy or alternative source utilization.

Example - Control measures such as treatment facilities would require energy for operation of the facilities and attendant equipment. It is possible to design such facilities to be energy efficient or for multiple uses.

- Control measures which require machinery (trucks) use energy (diesel fuel/gasoline).
- Cleaning storm drainage systems requires energy (pumps, flushing etc.).
- Redesigning curbs and gutters requires energy both by virtue of any machinery used (air hammers, dump trucks) and the energy to produce the concrete/asphalt for replacement.

### Impact Questions:

Would the control measure(s) have an impact on:

#### 1. energy consumption/demand?

Discuss the potential for the control measure to affect area demands for natural gas, electricity, petroleum, and/or coal or other non-renewable energy

#### 2. energy conservation/supply?

##### a. efficiency in the use of energy?

(e.g., multiple uses of facilities, dual activity programs etc.)

##### b. energy use during peak hours?

##### c. energy use during off peak hours?

(Response to b. and c. should consider the energy demands of a control measure and whether operation would occur during peak or off peak hours).

d. resource recovery and recycling?

(These impacts should be addressed in the discussion on solid waste impacts).

e. energy production as a by-product of residuals management?

(These impacts should be addressed in the discussion on solid waste impacts).

f. solar energy production?

(Note the impact of the control measure on use of alternative energy sources)

Information Sources:

EnergyImpacts Handbook (Draft, Dec. 1976), Calif. Energy Resource & Conservation Development Commission.



## Amenities

### Effect on visual amenities

- o Preservation of scenic areas, the natural state of the environment and open space
- o Height and bulk of structures required for or affected by the plan
- o Visibility impact of clean air
- o Appearance of urban landscape

### Background:

Control measures may require a site for implementation or may involve construction of facilities. They may impact land development patterns and thus exert pressures for development in scenic areas or which could adversely affect viewsheds. Control measures may impact overall visual quality by affecting visibility and/or the appearance of the urban landscape.

Example - Control measures such as "construct treatment facilities" could adversely affect highly scenic areas, coastal viewsheds if constructed in such areas.

- Impoundments could impact highly scenic areas/alter natural landforms.
- Regrading and reseeding could improve/maintain the appearance of the urban landscape and viewsheds.

### Impact Questions:

Would control measure(s):

1. be implemented/located such that they would impact the visual qualities of:
  - a. the coastal viewshed? (e.g. coastal lands and waters that can be seen from coastal highways and access roads, trails, railroads, public vista points, recreation areas, the waters edge)
  - b. highly scenic areas? (e.g. ridges, oak woodlands and redwood concentrations, scenic waterbodies, agricultural valleys, landscape preservation projects)
  - c. open areas with particular value in providing contrast to urbanization, in preserving natural landforms etc?
2. influence development patterns such that scenic areas, viewsheds, natural landforms could be affected through development, blockage, litter etc?
3. impact (improve/degrade) the overall visual quality of an area by affecting visibility?
4. impact (improve/degrade) the appearance of the urban landscape?

### Information Sources:

California Coastal Plan, California Coastal Zone Conservation Commission 1975; "Visual Landscape Relationships - Part A Task 3 of Regional Transportation Plan" and Amenities Map, Wallace, McHarg, Roberts & Todd for Metropolitan Transportation Commission 1974; Maps - BCDC, Appearance & Design & East Bay Parks; Protected Waterways Plan, State Resources Agency, 1971; See also Information Sources for Physical Resources - Recreation Sites.

## Amenities

### Effect on historic and cultural resources

- o Impact on historic landmarks, monuments, districts, archaeological sites and other areas of historic or cultural significance
- o Impact on sites with special water-related historic significance

### Background:

The Bay region's heritage is reflected in its many cultural resources -- historic, architectural and archaeological. These resources contribute to an esthetically diversified environment. They provide educational and scientific opportunities, are an important part of tourism, and contribute to the unique character of the region. Control measures may impact historic and cultural resources by affecting the resource base or access to and use of these resources.

Example - Control measures which consume land (detention basins, treatment facilities, impoundments) may impact cultural resources if implemented on or adjacent to such sites.

- Measures such as maintain open space, slope density standards and control development patterns may benefit cultural resources by protecting them and enhancing access to and use of them for education and scientific purposes.

### Impact Questions:

Would the control measure have an impact on:

#### A. The Resource Base

1. properties (buildings, structures, objects, sites, districts) in or nominated for inclusion in the National Register of Historic Places?
2. buildings and sites inventoried through the National Survey and the Historic American Buildings Survey?
3. historic properties maintained by the California Department of Parks and Recreation?
4. registered California Historical Landmarks?
5. properties listed on the California Points of Historical Interest list?
6. other properties included in the California Inventory of Historic Resources?
7. areas designated by local ordinances as historic districts?
8. communities or neighborhoods distinguished by special cultural, historic, architectural or aesthetic qualities?

## B. The Use of the Resource Base

1. affect access to properties, communities, neighborhoods with cultural or historical significance?
2. affect use of the resource base for education, scientific, tourism purposes or community cultural affairs?

### Information Sources:

California Department of Parks and Recreation, Office of Historic Preservation; State Historical Resources Commission; County Historical Societies; County and City Planning Departments; County General Plans e.g. "An Element of the General Plan of Santa Clara County", "Historic Preservation Program: Environmental Resources Management Element Sonoma County General Plan"; National Park Service, Office of Archaeology and Historic Preservation; EIR and EIS documents; California Inventory of Historic Resources, Department of Parks and Recreation, 1976; California Coastal Plan; California Coastal Zone Conservation Commission 1975; Shellmounds of the San Francisco Bay Region, N.C. Nelson; Historic Preservation in Napa, Napa Community Redevelopment Agency, 1974; The Urban Design Plan for the Comprehensive Plan of San Francisco, Dept. of City Planning; "Map Showing Locations of Samples Dated by Radiocarbon Methods in the San Francisco Bay Region", USGS Basic Data Contribution #33, Robert W. Wright (Miscellaneous Field Studies Maps MF-317).



## Amenities

### Effect on noise

#### Background:

Noise pollution is the contamination of the acoustical environment by noises which adversely affect people. People may experience noise pollution from indoor or outdoor sources. It is the latter sources, which result from control measure implementation, that are of primary concern here.

The outdoor noise environment varies significantly in magnitude and character among various locations in a community and with time of day in each location. The effects of community noise can be experienced by people whether they are in or out of doors. Levels of environmental noise requisite to protect the public health and welfare with an adequate margin of safety have been established by the Environmental Protection Agency. The Office of Noise Control of the California Department of Health administers the State noise control program in conjunction with local governments.

A noise analysis is generally undertaken with a site specific orientation - either to assess a new source's impact on the existing noise environment or to assess whether a given facility should be located on a specific site given the existing noise levels surrounding it. Such analyses require baseline noise information such as noise contours and/or field measurements to determine whether levels requisite to protect the public health and safety will be exceeded. Control measures which involve machinery can be expected to result in the generation of single event noises for brief intervals of time.

Example - Control measures which involve equipment (street sweeping, construction of detention basins, treatment facilities, impoundments, clean storm drain system, stabilize and redesign channels) will have noise impacts of a single-event or intermittent nature.

#### Impact Questions:

Would the control measure(s) have an impact on:

1. the ambient noise level in the area of implementation?

A qualitative discussion is necessary focusing on the noise level changes associated with the control measure. In judging the effect of the changed noise level, consideration should be given to the land use of the impacted area (residential, commercial, industrial) and the time of day of implementation in determination of effects on ambient noise levels. In addition, where a community noise program is in effect, established noise emission standards for city and county owned and operated vehicles would serve as a controlling factor. Standards may also be in effect for noise emissions from public works projects and construction and maintenance activities.

#### Information Sources:

Public Works Departments, City and County Planning Departments, Office of Noise Control California Department of Health.

Noise Element, General Plans; Noise Assessment Guidelines, F. Schultz and N. McMahon for U.S. Department of Housing and Urban Development, 1971; Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, U.S. Environmental Protection Agency, 1974.

## CHAPTER 3

### INSTITUTIONAL AND FINANCIAL CRITERIA PROCEDURES





## FISCAL EFFECTS ON LOCAL GOVERNMENT

### Introduction

The implementation of control measures for the reduction of surface runoff pollution will probably create fiscal effects on local government. This chapter is designed to assist in the identification of the fiscal impacts of control measures.

The exact nature of the fiscal impact will obviously depend on the type of control measure. For example, the construction of redesigned curbs and gutters may involve only capital costs. The local jurisdiction might choose to cover these capital expenditures by issuing general obligation bonds or using cash reserves. The different financing methods would have very different fiscal impacts.

Alternatively, a control measure (e.g., cleaning the storm drain system) may generate only operating costs for labor and supplies. A jurisdiction could decide to raise the property tax rate, increase revenues received from permit fees, or create a special assessment district. Again, the fiscal impacts would depend on the specific mechanism for financing the control.

The method of implementing a single control measure may affect the nature of the fiscal impact. For example, the adverse water quality effects of dog litter may be reduced through a program of public education to acquaint dog owners with the problems caused by the droppings. Such a program would require some public expenditure to reduce pollution from dog droppings. The public education program would achieve the desired end with a net cost.

However, the jurisdiction could choose to reduce pollution from dog litter by increasing the fees for registering pets and establishing fines for failure to register the animal. In addition, citations (similar to parking tickets) could be issued to people who allow their dogs to roam without a leash or eliminate on a public street. This method of implementation would cause increased expenditures for enforcement, but it would also generate increased revenues from fines and fees. In this case, it is likely that the additional revenues would more than offset the extra cost. Thus, the pollution from dog droppings could be reduced with a net revenue.

### Assumption

Throughout the assessment of the fiscal effects of surface runoff controls on local government, it must be assumed that Federal and State grants will not be provided for facility construction or program implementation. This assumption may prove false; Congress or the Legislature may establish assistance programs for the implementation of surface runoff controls. However, the assumption is necessary to assure that the full extent of the local fiscal impact is revealed. For the assessment of the full impact, it must be assumed that local governments will have to fund local programs entirely from local revenues.

## Fiscal Effects on Local Government

- o Impact on general obligation, revenue, or special assessment bonds and bonding capacity.

### Background:

Local governments generally pay operating and maintenance expenses from current revenues. However, capital investments are often funded from the proceeds of the sale of bonds. Indeed, bonded indebtedness is the major source of revenues for financing capital improvement projects.

There are three general types of debt instruments which can be used to finance the implementation of environmental management plans. Two of these instruments, general obligation bonds and assessment bonds, use the property tax as a source of debt service funds. The third type of debt instrument, revenue bonds, are guaranteed by revenue producing enterprises.

General obligation bonds guarantee the "full faith and credit" (unlimited property taxing authority) of the issuing jurisdiction for payment of the debt. Because of the relatively high degree of security and favorable tax incentives, the interest rate or cost of debt service on general obligation bonds is usually less than other types of bond instruments.

Another type of debt financing, which relies on property taxes for payment, is assessment bonds. Assessment bonds extend the capital cost of the project over the area benefited by the project. A special assessment district is created and each land parcel is assessed a pro rata share of the bonded debt. In California there are two types of assessment bonds:

- (1) 1911 Act Bonds -- Bonds are issued against specific parcels for the amount of the debt or assessment on that parcel. Billings for retirement of the debt (principal and interest) are sent to each parcel owner. The City or County treasurer transmits the revenues to the holder of the bonds. In case of default, the bond holder is allowed a recourse similar to mortgage foreclosure.
- (2) 1915 Act Bonds -- These are serial bonds issued against the entire assessment district. Bills for payment of principal interest are included with the regular tax bill for each property owner rather than being mailed separately. However, the annual assessment bond payment is a flat fee and not part of the general property tax rate. The remedy for default allows city or county officials to sell delinquent properties. If the funds from such sale and other resources are insufficient to retire the debt, the jurisdiction is required to levy a tax of up to \$.10/\$100 A.V. per year on the assessed evaluation throughout the city or county to meet the delinquency.

Revenue bonds, which do not depend on the tax base, can be issued for the financing of revenue producing enterprises. These bonds may be secured only by the revenues from the enterprise. In some cases, the bonds may include a partial jurisdictional guarantee through a lease arrangement with the city or county. The bonds are guaranteed to the extent that the jurisdiction is required by the lease agreement to make annual rental payments to the revenue enterprise.

The amount of general obligation debt that any single jurisdiction can incur is subject to some limitations. The specific limit depends on the type of jurisdiction and the type of project funded by the general obligation bonds. The debt limit for general law cities and counties is 5% of the total assessed valuation of the jurisdiction. This debt limit can be raised to 15% of assessed value, if the project includes development of water, sewer, irrigation systems, and special roads. Charter cities and counties are allowed to establish their own debt limit.

The debt limit for special districts varies depending on the type or purpose of the district. Park and Recreation districts cannot issue bonds which exceed 5% of the assessed valuation of the district. Certain types of special districts (e.g., municipal utility districts or community service districts) may issue bonds for up to 20% of the assessed value of the district. Other types of districts (e.g., water districts or sanitation districts) have no limit on the bonds that may be issued except for the willingness of the voters to approve such issues.

Although interest on assessment and general obligation bonds is limited to 8%, the bonds can be sold at less than par or face value to make them marketable. Effectively, the bond price is discounted to raise the yield to the investors thus making the bond more competitive with other types of investment opportunities. However, this raises the cost of financing since more bonds must be issued to yield the capital required for the project.

#### Impact Questions:

Will general obligation bonds be issued to finance projects required by alternative plans?

Will these general obligation bonds be issued by only certain identifiable jurisdictions?

What is the anticipated cost of debt service for the general obligation bonds to be issued?

Note: This impact should be expressed in annualized total cost and the amount of increase in the property tax rate.



What is the impact on bonding capacity for each jurisdiction?

Note: The bonding capacity is the difference between the total amount of outstanding general obligation bonds and the debt limit for the specific jurisdiction.

Will assessment bonds be issued to finance alternative plans?

Can the issuing assessment districts be identified?

Will new assessment districts be required?

What is the anticipated cost of debt service on these assessment bonds?

Will revenue bonds be issued to finance alternative plans?

What is the anticipated cost of debt service on the revenue bond?

What are the projected revenues from the project(s) constructed under the plan?

Will the project qualify under existing State or Federal grant programs which would reduce the need to issue bonds?

Note: It should be assumed that no new grant programs will be authorized. Furthermore, it should be assumed that the qualifications for existing programs will remain unchanged.

Will the project qualify for State or Federal loans or loan guarantees?

Information Sources:

County assessors, city and county tax collectors, treasurers or finance officers.

County Tax Rate Book (printed annually for each county).

California State Controller, Annual Report of Financial Transactions Concerning Cities of California.

California State Controller, Annual Report of Financial Transactions Concerning Counties of California.

California State Controller, Annual Report of Financial Transactions Concerning Special Districts of California (other than water utility).

California State Controller, Annual Report of Financial Transactions Concerning Water Utility Operations of Special Districts of California.



## Fiscal Effects on Local Government

### o Impact on property tax base.

#### Background:

The basis of the property tax is property. For any city, county or special district, the property tax base is the assessed valuation of the jurisdiction. In California property is taxed according to provisions of Article XIII of the Constitution of California. This provides that "[a]ll property in the State...shall be taxed in proportion to its value...." The Article defines property to include "monies, credits, bonds, stocks, dues, franchises and all other things real, personal and mixed capable of private ownership...."

In California the property tax base can be classified into two categories: secured and unsecured. The secured tax base is the real property including land and improvements. The unsecured property tax base is the personal property of individuals residing in the jurisdiction. Effectively, the unsecured property tax is a levy on the tangible business property including equipment and inventory. However, when a business enterprise owns the land on which the business is conducted, the inventories, fixtures, machinery, office furnishings and other property is considered to be part of the secured tax base because it is "secured by the land."

In California the tax base or assessed value should be 25% of the fair market value of the property. (The Property Tax Relief Act of 1972, known as SB 90, made several changes in the California property tax financing including a 50% exemption on the full market value of business inventories.) The fair market value estimates are based on the present market selling price as determined by recent sales of comparable properties. However, because of inflation or rising property values and the County Assessor's practice of periodic reassessment, the assessed value will often be somewhat less than 25% of the market value. In 1975-76, the statewide average for assessed value was 24.7% of the full market value.

Surface runoff control measures can increase the property tax base in two ways. First, control measures could impact the secured property tax base by imposing development restrictions which affect the price of property in the entire market or by requiring improvements which increase the market value of specific properties. For example, the construction of roof-top storage facilities on factories could increase the market value of the property. If the cost of the storage were 2% of the cost of the factory, the market value and consequently the assessed value could be expected to increase by a similar percentage.

The second method of increasing the property tax base is through the impact of control measures on unsecured property. Surface runoff controls might necessitate business investment in new equipment or fixtures. The assessed value of this new equipment would become part of the property tax base. Again, the assessed value would be expected to increase in proportion to the relative cost of the new and existing equipment and fixtures.

Implementation of control measures may also cause decreases in the property tax base. The tax base may be decreased directly through public condemnation action (eminent domain) to secure property for public improvements. In this case the decrease would be equal to the assessed value of the land and improvements.

The property tax base may be decreased indirectly by controls which create disincentives for future capital investment. In this case, control measures which made future property development or business investment substantially more expensive would tend to reduce anticipated development and investment and slow the historic rate of increase in assessed valuation. However, this indirect or synergistic effect will be difficult to estimate.

Impact Questions:

Will control measures affect the value of secured property?

Can the specific types of affected land uses be identified?

Will control measures affect the assessed value of unsecured property?

Can the specific types of affected businesses be identified?

Information Sources:

California State Board of Equalization, California State Board of Equalization Annual Report.

U.S. Department of Commerce, Bureau of the Census, County and City Data Book, 1972. Washington, D.C.: U.S. Government Printing Office, (1973).

California State Controller, reports previously cited.

California State Controller. Assessed Valuation and Tax Rates of the Counties of California. (Annual)

Assessment information from housing supply criteria.

## Fiscal Effects on Local Government

- Impact on property tax rate

### Background:

The property tax is the single largest source of revenue for local governments in California. Cities, counties, school districts and most other special districts levy a property tax on both secured and unsecured property. Some special districts tax only real property and certain of these restrict their levy to only the value of the land. Property tax assessment and collection are generally county functions. However, there are two cities in the Bay Area (Alameda and Piedmont) which collect their own property tax.

The Property Tax Relief Act of 1972 (SB 90) placed limitations on the ability of local governments to raise revenue through increases in the property tax rate. The Act limited taxing jurisdictions from raising the property tax rate without voter approval. Each jurisdiction had a choice of using either the 1971-72 property tax rate or the 1972-73 rate as their maximum. Absent voter approval, a jurisdiction could not raise the property tax rate above this limit. However, there are several exceptions to the general rule which allow the property tax rate to exceed the limit in certain situations. The tax rate may be raised to pay debt service or retirement benefits that have been approved by the voters. The tax rate may also be raised to cover the cost of activities mandated by either the Federal government or the courts. In addition, the tax rate may be raised if increased property tax revenues cannot keep pace with increases in the jurisdiction's population and increases in the cost of living.

Two additional exceptions to the SB 90 limit are allowed for emergency situations. After defining a specific emergency situation, the city or county may increase the maximum rate 1% for one year with a vote of 4/5 of the governing board. Alternatively, the board may ask the Governor to declare a "dire emergency" and, following public inquiry, the State controller may declare an emergency tax rate.

Historically, impacts on the property tax rate could be easily estimated. The cost of new projects or programs not covered by other revenue sources would be divided by the assessed valuation of the jurisdiction. This would yield the net change in the property tax rate. Now, however, the analyst must check the tax rate limit and in some cases, exceptions to that limit in determining the impact of control measures on the property tax rate.

### Impact Questions

Will control measures necessitate an increase in revenues from the property tax?

Will increasing assessed values be sufficient to meet new property tax revenue requirements without tax rate increases?

Will the new property tax rate exceed the maximum limit?

Is the new tax rate allowable under the legislated exceptions to SB 90?

Information Sources:

California State Controller, Division of Local Government Fiscal Affairs. Report of Budget Requirements and Means of Financing Adopted by California Counties.

County Assessor's Office "County Tax Rate Book" (published annually in each county).



## Fiscal Effects on Local Government

### o Impact on sales and other taxes

#### Background:

##### Retail Sales Tax

A local retail sales tax of 1% is collected by the State of California and rebated to the city in which the sale takes place. If the retail sale is made in an unincorporated area, the sales tax revenue is rebated to the county. In addition, over half of the California counties have agreements with their cities whereby negotiated portions of the sales tax collected in a city is shared with the county.

The amount of revenue from sales taxes is directly determined by the amount of taxable sales in a jurisdiction. However, taxable sales are affected by several factors including the quantity and attractiveness of retail facilities, the number of shoppers, and their incomes and expenditure patterns.

Retail sales tax revenue is not directly related to population since the revenue is returned to the site of the sale. This results from differential levels of per capita retail sales among communities which is not necessarily related to differential income levels of each community's residents. Generally, however, retail sales tax revenue for any jurisdiction will be effected in two ways. First, increases (decreases) in population or personal income will cause increases (decreases) in expenditures for taxable items. For small changes, this can usually be assumed to be a direct linear relationship.

Second, openings of new sales outlets can often increase sales tax revenue by attracting customers and consequently taxable purchases from neighboring jurisdictions. The degree to which businesses in one jurisdiction can attract customers from another jurisdiction is often referred to as the capture rate. However, new commercial facilities alone may not increase sales tax revenues. If a new shopping center attracts customers from existing downtown shopping areas, without increasing overall sales, the revenue from sales taxes to the jurisdiction will remain unchanged.

##### Property Transfer Tax

The property transfer tax applies to sales of real property, including land and improvements. Since 1968 this tax has been available to cities and counties in California. The tax is levied at the rate of \$1.10 per \$1,000 sale value of the property transfer. However, the taxable sale value is exclusive of any lien or encumbrance on the property.

If the site of the sale lies within a city which has enacted the tax, the proceeds are shared equally by the city and the county. If the site of the sale lies within an unincorporated area, the entire revenue from the property transfer tax accrues to the county.

Revenues from the property transfer tax may be impacted by changes in the number of property transfers or changes in the sale value of the property.

## Vehicle Code Fines

Vehicle code fines provide a restricted revenue source for local governments. Monies from fines and forfeitures as a result of vehicle code violations may be used only for "traffic signs, signals, other traffic control devices, the maintenance thereof, equipment and supplies for traffic law enforcement and traffic accident prevention, and for the maintenance, improvement or construction of public streets, bridges and culverts..., but such fund shall not be used to pay the compensation of traffic or other police officers."

The allocation of vehicle code fines between state, county and city will vary. Most of the revenue from fines for citations issued within a city will go to that city. However, a small percent (20 to 30) will go to the county to defray court costs. The actual percentage of this shared revenue is subject to agreement between the city and the county. Revenues from citations issued in the unincorporated area go entirely to the county.

Revenues from vehicle code citations are generally responsive to changes in population. However, it is not a simple linear relationship. Average per capita vehicle code fines in any city increase as the population of the city increases. For small cities (under 5000 population), per capita vehicle fines average less than one dollar per year. For cities between 50,000 and 100,000 population, the average is 3 to 4 dollars per capita. For older or larger cities, other factors become important such as the age of the city, the conditions of the streets, traffic, parking problems and other factors including vehicle code enforcement.

For both cities and counties, the most accurate way to estimate changes in revenues from vehicle code fines will be on the basis of population. However, factors like construction of new roadways or changes in a number of private vehicle trips will effect this general estimate.

## Utility Franchise Tax

Cities may impose a tax on utility operations. The tax may either be imposed on utility service itself or on the consumers of that service. The utility tax is usually levied as a percentage of the total utility charge. In most jurisdictions the tax is applied to natural gas, electricity, and telephone services. In some instances, cable television services are also taxed.

Revenue from a utility tax are based on the consumption of the taxable utility services, the charge for the service, and the tax rate. Typically, the utility tax rate is 5% of the billing charge. Utility charges differ among categories of consumers as well as utility companies and type of energy. Charges generally decrease on an incremental basis. The more a particular consumer uses a utility the less they will pay per unit.

Consumption of taxable utility services can be projected on basis of the number of households in the jurisdiction and average household consumption. Increases in commercial and industrial consumption can be estimated on the basis of the historic ratio of commercial and industrial growth to residential development unless obvious conditions intervene to change these factors.

## Transient Occupancy Tax

The transient occupancy tax is levied at the discretion of cities and counties on consumers of lodging services in their jurisdictions. Most commonly a rate of 5% of the lodging price is imposed. However, the tax does not apply if the period of occupancy is longer than 30 days.

The revenue from transient occupancy taxes can be effected in three ways. First, revenues to a jurisdiction can be expected to increase if the vacancy rates at lodgings within that jurisdiction decrease. Second, revenues will generally increase in response to increases in the number of hotel and motel rooms available within a jurisdiction. Finally, because the transient occupancy tax is a direct function of the cost of lodging, revenues will increase in response to increases in the average cost per room.

### Impact Questions:

Will control measure(s) implementation within any jurisdiction cause:

changes in the disposable income of families in the jurisdiction?

changes in the ratio of taxable and non-taxable purchases?

changes in the captured rate of taxable purchases from outside the jurisdiction?

changes in the number of property transfers?

changes in the sale value of property?

changes in private vehicle use?

changes in traffic congestion?

changes in parking regulations?

changes in traffic patterns or road conditions?

changes in the enforcement of existing vehicle code regulations?

changes in average household utility consumption?

changes in commercial or industrial utility consumption?

changes in utility rates?

changes in the number of households?

changes in the occupancy rate of transient lodgings?

changes in the number of transient lodging units?

changes in lodging rates?



### Information Sources:

California State Board of Equalization. Taxable Sales in California, published quarterly. (Detailed breakdown of sales in small area studies are available from the State Board of Equalization.)

U.S. Department of Labor, Bureau of Labor Statistics, "Annual Consumption Costs for Urban Family of Four", published Autumn '72.

Urban Land Institute, The Dollars and Cents Shopping Centers. 1972.

U.S. Department of Labor, Bureau of Labor Statistics. Three Budgets for an Urban Family of Four Persons, 1969-70, Bureau of Labor Statistics Supplement 1570-5.

State of California Controller reports, previously cited.

U.S. Department of Commerce, Bureau of the Census. County and City Data Book, 1972.

State of California Energy Commission. Fuel and Energy Summary (Volume 2 contains first and second quarters of 1976, third and fourth quarter information should be available soon.)

State of California Energy Commission, Energy Forecast and Planning Report, September, 1976.

Pacific Gas and Electric Company. Econometric Model and Forecast of Demand for Electricity, 1976-1995. (20-year energy forecast filed with Energy Commission 9 August 76 in compliance with Section 25300 of the Public Resource Code.)

State Board of Equalization, Statistical Research and Consulting Division. Data for Estimating Local Sales Tax Revenues and Cigarette Tax Subventions.



## Fiscal Effects on Local Government

- o Impact on fees, licenses, and other user charges.

### Background:

#### Business License Tax

Cities and counties in California may require a license tax from businesses which operate within their jurisdictions. The actual rate of this tax will vary among jurisdictions and types of business enterprises. The fee can be a flat amount for all businesses or it may be graduated depending on the size of the business. In the Bay Area business license taxes are typically computed on the basis of either gross receipts, gross payroll, the number of employees, the value added to the product, the cost of production factors, or simply a fixed rate. In cases of some special business enterprises, the business license tax may be computed on a factor that is specific to that business (i.e., tax on bowling alleys is often computed on the basis of the number of bowling lanes). Commercial and local-serving industrial development usually follow residential growth. Therefore, long term changes in revenues from business license fees will be related to population growth.

#### Development and Construction Fees

Private development of residential, commercial or industrial areas will cause public costs for the establishment of municipal services to the new developments. Cities and counties charge processing and development fees to offset the cost of providing these new services.

Each unit of local government has an itemized schedule of fees and charges for types of development within their jurisdiction. Generally, development fees associated with construction reflect the public cost incurred to review plans or to expand and connect various public services. However, the actual rate for these fees are specific to individual local governments.

Typical processing and development fees will include subdivision development fees, park dedication fees, fire protection and community facilities assessments, and school fees which are charged on a basis of the number of dwelling units or some equivalent in the development. Other fees include building permit fees, engineering inspections and utility permits which are charged on the basis of the total construction costs. Finally, fees like annexation assessments or drainage fees are charged on the basis of the number of acres developed.

#### Motor Vehicle License and Trailer Coach Fees

The motor vehicle license fee is an annual 2% tax on the market value for motor vehicles and trailers. A 2% tax is also levied on the market value of trailer coaches and mobile homes in the form of a trailer coach fee. Because tax is levied in lieu of a personal property tax on the vehicles this fee is referred to as the "In-Lieu" tax.

Revenues from the motor vehicle license fee and trailer coach fees are collected by the Department of Motor Vehicle at the time of vehicle registration. The revenues from these fees are deposited in the Motor Vehicle License Fee Fund.

After deducting administrative costs for the DMV the remaining net revenue (except from trailer coaches) is apportioned 50% each to cities and counties. Revenues are divided between cities based on the proportion that the vehicle population of each bears to all other vehicles and are divided among counties in proportion to county population.

License fees paid on trailer coaches are apportioned to the county where the trailer coach is located. If the trailer coach is located in a city, the fees are divided with one-third going to the city and one-third going to the county. The remaining third of the trailer coach fee will go to the local school districts. If a trailer coach is located outside of the city, the school districts and county divide the money equally.

#### Highway Users Tax

Gasoline sales in California are subject to sales and excise taxes. A portion of the revenues from both of these taxes are distributed to local governments. Of course the sales tax is distributed in proportion to the gasoline sales within any jurisdiction. Revenues from the excise tax however, are returned to cities and counties on the basis of motor vehicle registration, assessed valuation, population, and maintained road mileage.

The State of California charges an excise tax of 7¢ per gallon of gasoline. Revenues from this excise tax are distributed to cities, counties and the State Highway Fund. According to Section 2104 of the Street and Highway Code, counties received 23% of the excise revenues (\$0.01625 per gallon). Three-fourths of the Section 2104 revenues are apportioned among the counties in proportion to the average number of vehicles registered in each county. Some of the remaining Section 2104 revenues are allocated to counties for engineering, administration, snow removal costs, and heavy rainfall and storm damage. The remaining monies are allocated in proportion to the number of miles of maintained county roads.

Section 2107 of the Street and Highway Code allocates 10% of the highway users tax (\$0.00725 per gallon) to cities within the State. Flat fees are allocated to cities for snow removal and road engineering and administration. The balance is apportioned among cities on the basis of the population that each city bears to the total population of all cities in the State.

Section 2106 of the Code allocates 15% of the highway users tax (\$0.01040 per gallon) to both counties and cities. Under this section each county and city receives a flat monthly fee of \$800 and \$400 respectively. In addition, \$30,000 is directed each month to the State Bicycle Lane Account. The balance of the revenues are then divided among the counties and the cities of the State by a three-step process. First, funds are divided among the counties on the basis of average motor vehicle registration. Second, in each county, funds are divided between the county and the cities in that county on the basis of assessed valuation. Finally, the revenues allocated to each county's cities are distributed among the cities according to relative population.

Section 2108 of the Street Highway Code allocates the remaining 52% to the Highway Users Tax or excise tax revenues (\$0.03610 per gallon) to the State Highway Fund.



Local revenues from in Lieu taxes or gasoline sales (both the excise taxes and sales taxes) will be affected by control strategies which tend to reduce either the number of vehicles on the road or number of miles driven.

### Cigarette Excise Tax

According to Section 30462 of the Revenue and Taxation Code, the cigarette excise tax is levied on all cigarettes sold in the State of California. The cigarette tax is 10¢ per package, based on wholesale distribution. It is collected by the sale of stamps or metered impressions to cigarette distributors. Revenues from the cigarette excise tax are distributed to the State Controller, to cities and counties, and to the State General Fund.

The local share of the cigarette excise tax is 30%. These local revenues are apportioned on the basis of the sales tax revenue distribution. Between all cities and counties the monies are divided in the same proportion that the local sales tax was distributed between cities and counties in the previous calendar quarter. Each county's share is paid in accordance with this distribution. Then the city's share of the cigarette tax revenues is divided in half. The first half of the revenue is distributed in proportion to relative local sales tax revenues of that city. The second half is distributed in proportion to relative populations.

Because of the taxing and distribution formulae, the cigarette tax revenue for any jurisdiction will depend on the statewide consumption of cigarettes and the relative local share of the State's sales tax revenues and population. However, changes in any of these factors are not likely to have a significant impact on local revenues since the cigarette tax represents approximately 0.85% of the revenues for local government.

### Alcoholic Beverage Control Licenses

The State of California charges a fee for the issuance of alcoholic beverage control licenses. Liquor licenses are issued at various rates to manufacturers, wine growers, distributors and retailers of several categories. Fees from the original on-sale and off-sale licenses and license transfer fees are paid into the Alcoholic Beverage Control Fund. Monies deposited in the ABC Fund are available only for refund and transfer to the State General Fund. However, license renewal fees are also deposited in the ABC Fund from which only 10% is transferred to the General Fund. The balance is apportioned to cities and counties on a semi-annual basis. The apportionment to each city and county depends on the amount of fees collected in the city or the unincorporated areas of the county relative to the total fees collected throughout the State.

Local revenues from alcoholic beverage control license fees are not expected to be highly responsive to the implementation of surface runoff control measures unless major development occurs in a specific jurisdiction.

## Parking Fees

Local governments also receive revenues from fees, licenses and other user charges assessed within the jurisdiction itself. Most cities receive fees from parking meters or municipal parking lots. Control measures which impose parking restrictions in order to improve the effectiveness of mechanical street sweeping operations will likely affect parking fee revenues.

## Animal License Fees

City and county governments receive revenues from the issuance of licenses for domestic animals, usually dogs. The revenues from these fees are related to the number of dogs in the jurisdiction and the enforcement activity. It is estimated that in many parts of the Bay Area there are approximately 17 dogs for every 100 people; however almost half of these pets are unlicensed. Control measures designed to eliminate dog droppings on public streets are likely to affect animal license revenues in two ways. First, control measures could affect the number of dogs in the jurisdiction because people might recognize the pollution problem caused by dogs and choose not to have them as pets. Second, the implementation or enforcement of the pollution control measure could affect the ratio of dogs that are licensed.

In addition, municipalities often require registration of livestock and certain types of exotic animals that are maintained as pets within the jurisdiction. Surface runoff control measures could affect revenues from livestock and exotic animal fees in a manner similar to the fees from domestic animals.

## Pesticide Distributor's License and Pesticide Tax

Counties in California receive revenue from the sale of pesticides and the licensing of pesticide distributors. Section 12841 of the Food and Agriculture Code imposes a tax of 8 mils per \$1.00 on the sale of registered label pesticide materials; five-eighths of the revenues raised from this tax on the sale of pesticides is distributed among the counties. The apportionment to each county is in relation to the monies spent by that county on pest control and pesticide use management programs.

Section 12104 of the Food and Agriculture Code imposes a \$50 license fee on all pesticide distributors. Half of the monies collected under the pesticide distributor's license fee are apportioned among the counties in relation to the relative number of pesticide distributors in each county.

Local revenues from the sale of pesticides and the registration of pesticide distributors may be affected by the implementation of surface runoff control measures. Controls which tend to reduce overall sales of pesticides and reduce the number of pesticide distributors will tend to reduce local revenues distributed under these programs. However, if pesticide use enforcement programs are increased disproportionately in urban counties for control of urban runoff, the revenues distributed from the sale of pesticides would tend to be increased in those urban counties.



Impact Questions:

Would the implementation of the control measure(s) in any jurisdiction have an impact on:

the number of business enterprises?

the number of employees?

the total amount of gross receipts?

the total gross payroll?

the total cost of production factors?

business license fee schedules?

residential dwelling unit construction?

commercial facility construction?

industrial plant construction?

the rate of land development?

the ownership of private vehicles?

the ownership of coaches and trailers?

gasoline consumption?

cigarette consumption?

the number of retail alcoholic beverage outlets?

the number of parking meters?

the number of spaces in parking fee lots?

parking rate structures?

the number of domestic animals?

the percent of domestic animals which are licensed?

the number of registered livestock?

the number of registered exotic animals?

the extension of registration requirements to other types of animals?

the amount of registered pesticide sales?

relative expenditures on pest control and pesticide use management operations?

number of pest control distributors?

## Information Sources

City and County Tax Collectors, Chambers of Commerce,

City and County Engineers, Planning Department, Public Works  
Department, Building Department, .

State Department of Motor Vehicles, .

Alcoholic Beverage Control Board, .

County Animal Control Office, SPCA, .

City and County Treasurer; Division of Accounting, State  
Controller's Office.

California State Controller Report of Financial Transactions Concerning  
Streets and Roads of Cities and Counties of California.

California State Controller. Highway Users Tax Fund Apportionment (monthly)

California State Controller. Allocations to Certain Counties for Snow  
Removal and for Heavy Rainfall and Storm Damage. (Annual)

California Department of Food and Agriculture. Pesticide Use Report.  
(published annually).

California Department of Alcoholic Beverage Control. California Licensed  
Importers for Alcoholic Beverages. (Published annually; arranged alpha-  
betically by County).

California Department of Alcoholic Beverage Control, Alcoholic Beverages  
Licenses.

California Department of Alcoholic Beverage Control. Licenses Automatically  
Revoked Under Section 24048.1 of the Alcoholic Beverage Control Act. (Pub-  
lished separately for both fiscal and annual years.)

Department of Motor Vehicles, "Statement of Transactions and Total Fees  
Collected" (monthly).

## Fiscal Effects on Local Government

### o Impact on Connection and Standby Charges.

#### Background:

Cities, counties and special districts, especially sewer and water districts, assess a hook-up fee on new developments for connection to existing public utility systems. Typically, sewer and water facilities are constructed to meet anticipated demand so that new facilities do not have to be built as each development occurs. However, the new developments must reimburse the local governmental unit for these expenditures in order to connect with the utility system.

The connection charges will vary depending on the type of governmental unit providing service and the type of service provided. Revenues from these connection fees are dependent on the fee structure and the rate of residential, commercial and industrial development in the jurisdiction. Control measures which affect the rate, timing and location of residential, commercial and industrial development will affect the revenues from these connection fees.

Recently, several jurisdictions have introduced standby charges for major consumers of public utility services. Typically, this takes the form of an industrial standby charge; an industrial user must "purchase" the capacity required from the sewer or water system. Generally, new industries are not charged interest on the plant cost until the buy-in date but the principal cost is based on the initial outlay for the facility. The rate of the fee is usually based on the estimated effluent volume. The schedules also include assessments for high-strength effluent or peak discharges.

#### Procedure:

Would the implementation of the control measure(s) in any jurisdiction have an impact on:

the rate or timing of residential development?

the rate or timing of commercial development?

the rate or timing of industrial development?

connection fee schedules?

the application of standby charges?

volume of industrial effluent?

the rate of the standby charge?

#### Information Sources:

Consult local officials and assessment information from urban patterns criteria.

## Fiscal Effects on Local Government

- o Impact on Federal and State grant subvention funding dependance and eligibility.

### Background:

State and Federal assistance generally takes two forms, categorical grants and block or entitlement grants. Categorical grants are tied to specific projects while entitlement grant funds may usually be spent for a variety of purposes.

In the last few years the Federal government has provided grant assistance to local, general and special purpose governments to control pollution. Many local governments have applied for and received monies from these categorical assistance programs, including: Construction Grants for Wastewater Treatment Works (EPA), Basic Water and Sewer Facilities Grants (HUD), and Water and Waste Disposal Systems for Rural Communities Program (USDA).

More recently, Congress approved the State and Local Fiscal Assistance Acts of 1972. Federal revenue sharing monies are distributed to local, general purpose governments through entitlements rather than by local application. Local governments are allowed substantial discretion in how they choose to spend the money, and many have allocated funds to pollution control programs.

Throughout this assessment, it has been assumed that units of local government would not receive State or Federal grants for facility construction or program management to control surface runoff pollution. This assumption of no additional grants may not prove true in fact, but it provides a constraint which will reveal the full extent of the fiscal impacts on local governments.

Even with this constraint, new pollution control programs, such as surface runoff controls, may cause a shifting of Federal Revenue Sharing expenditures at the local level. Such shifting would likely increase the dependence of local governments in general, and local surface runoff control programs in particular, on Federal grant assistance. Thus, surface runoff control measures could have an impact on grant spending without necessarily having any effect on current levels of State or Federal assistance.

Despite the assumption that local governments will not receive additional State and Federal assistance, some surface runoff control strategies may be eligible for categorical grant funding. The assistance would come from existing types of categorical grants such as those mentioned above.

### Impact Questions:

Would the implementation of the control measure(s) in any jurisdiction have an impact on:

expenditures from current or anticipated Revenue Sharing funds?

eligibility for additional State and Federal categorical assistance?



Information Sources:

U.S. President, Office of Management and Budget, Catalog of Federal Domestic Assistance, (Annual Report).

League of California Cities, Handbook for Planning and Managing Community Development, Sacramento, California: League of California Cities, 1974.

Association of Bay Area Governments, Financing Open Space for the San Francisco Bay Region, by Baxter, McDonald and Smart, San Francisco, California: 1973.

Association of Bay Area Governments, Federal Grant Study, Berkeley, California: 1975.

ABAG FAPRS (Federal Assistance Program Retrieval System).  
Local Finance Officer or Budget Director.

## Fiscal Effects on Local Government

- o Impact on Interest earnings and cash reserves.

### Background:

In fiscal year 1973, local general purpose governments received approximately \$240 million in investment earnings and interest income. This accounted for 1.6% of all local revenue (1.2% of county revenue, 2.3% of city revenues). Most of this income came from the interest on bank savings of cash reserves. Recently, with the advent of Federal revenue sharing, local government cash reserves and thus interest incomes have increased.

Since investment income is a direct function of the amount of capital invested, implementation of surface runoff control measures which necessitate expenditure of capital reserves will tend to reduce future interest earnings. The annual reduction in interest earnings will be equal to the product of the cost of the facility financed from reserve capital and the interest rate.

### Impact Questions:

Would the implementation of control measure(s) in any jurisdiction have an impact on:

cash reserves?

investment principal?

interest earnings?

### Information Sources:

City, county or special district, budget officer, finance director, controller, treasurer.

## INSTITUTIONAL

The success of the Environmental Management Program is largely dependent on developing implementable strategies. Several steps are involved in identifying the institutional and financial requisites for plan implementation. One step involves institutional analysis -- identifying the necessary legal authorities, whether they currently exist, what agency(s) has those legal authorities and what actions are necessary to gain the authorities when they do not currently exist. Another step involves financial analysis -- identifying alternative funding strategies. This also requires identification of the sources of funds, the necessary legal authorities or other regulations affecting use of the alternative methods and sources, whether such powers/authorities exist in various public agencies (or combinations of agencies) or what is required to gain such authorities.

These issues are of primary importance. However, the institutional and financial impact of various implementation strategies is also important. Such information will aid decision-making on which strategies to pursue. Examples of institutional impacts include the political feasibility of using existing legal authorities, the effects on intergovernmental coordination, and the reversibility of decision (including the implementing strategy).

The following procedures can be useful for institutional analysis although they are intended primarily to aid in institutional assessment. Further information and technical assistance for analyzing the institutional requirements for each alternative strategy can be provided by ABAG staff.

Institutional  
o Public acceptance

Background

Control measures must have an initial level of public understanding and acceptance to be adopted. This is particularly true of those measures that directly involve the public in their implementation. Control measures that are new and not well understood will have greater difficulty of acceptance, particularly if various segments of the public perceive that they might cause inconvenience. The assessment will focus specifically on which segment(s) of the "public" would find the control measure unacceptable.

Example - Control measures which regulate construction schedules or development patterns may not be acceptable to certain business, labor or industrial groups.

- Regulations insuring proper operation and maintenance of septic tanks may be unacceptable to low-income elderly residents in rural unsewered areas.

Impact Questions:

1. Might any of the following groups find the proposed control measure(s) unacceptable?
  - a. Any racial or ethnic group?\*
  - b. Any demographic (age, sex, etc.) group?\*
  - c. Any group of the disadvantaged, including low income?\*
  - d. Any business group?
  - e. Any agricultural or industrial group?
  - f. Any labor group?
  - g. Any community oriented group?
  - h. Any environmental group?
  - i. Any other group?
  - j. Unaffiliated individuals?

Where the answer to any of the questions is yes, please identify why the measures are unacceptable and indicate ways that they might be made more acceptable (e.g., more public information, different means of financing, less restrictive enforcement, etc.).

Information Sources

The target groups from which information/opinions about the acceptability of alternatives should be sought include representatives of these groups. Elected officials and public agency staff should not be the sources for answers to these questions.

A variety of "techniques" may be used to elicit opinions about acceptability, reasons and mitigation measures. These include--questionnaires (mailed or administered in person), less structured interview techniques (phone surveys), delphi techniques in workshop settings or roundtables. In addition, the public participation program set up in each county should provide another method to elicit answers about public acceptability.

\*The Equity procedure in the Social criteria chapter can be used to identify several of these special population groups that might be impacted. The reactions of individuals in those groups (acceptability) is the subject of this assessment procedure.



Institutional  
o Political and organization feasibility

Background

Various elected and appointed officials will be asked to evaluate proposals for new or amended laws necessary to carry out the surface runoff management plans. Their actions will be guided in part by various political considerations. The feasibility of successfully implementing the plan is obviously reduced when a large number of cities, special districts or other bodies are hesitant to enact the proposed laws. This assessment will identify the political support for a particular control measure and indicate what might be necessary to gain such support.

Similarly, the staff of departments or agencies involved in implementing the control measures will have attitudes about various aspects of the control measures. Such attitudes will be expressed both in their recommendations to their city council members or district representatives and may affect the manner in which they administer the control measures/alternative plans.

- Example - Any control measure implemented by a substantial increase in property taxes might be viewed negatively by elected officials.
- Measures to regulate agricultural practices and thereby reduce erosion might be opposed by officials with sizable rural constituencies.

Impact Questions:

1. Would implementation require new legislation or other legal actions to extend legal capabilities? (See Legal Capability procedure) If yes, list the governmental entities (such as examples below) that would be involved in seeking and adopting the legal changes required to implement the plan.
  - a. State commissions
  - b. Regional commissions and boards
  - c. County Boards of Supervisors
  - d. City councils
  - e. Special district boards

For those governmental entities listed in Question #1, discuss the political feasibility of gaining acceptance of new or amended laws necessary to carry out the plan. Should certain control measures/alternative plans be viewed negatively by any decision-maker, indicate the nature of the objection and ways to make that alternative more acceptable.

2. Identify departments or agencies that would be involved in reviewing and administering the control measure(s)/alternative plans.

For those departments and agencies listed in Question #2, discuss the feasibility of gaining favorable reaction to the control measure(s)/alternative plans. Should certain control measures be viewed negatively, indicate the nature of the objection and ways by which the measures could be made more acceptable.

### Information Sources

Elected and appointed officials as well as staff representatives from departments and agencies involved in implementing a control measure should be consulted. Respondents will likely base their answers on past experiences and will probably not need a great deal of background material (other than a full description of the control measures) in order to respond. They can be contacted individually or in groups; a workshop might be useful. Questionnaires, interviews, and delphi techniques might be the best techniques for eliciting answers.

Institutional  
o Legal capability

Background

The degree to which existing laws can be used to implement control measures is very important. If new laws are not required, the plan may be easier to carry out. The legal assessment will identify, by jurisdiction, the existing ordinances, regulations or statutes that can be used to implement the plan. It will also identify where a jurisdiction is legally limited, either by pre-emption or through charter limitations, from taking certain actions to carry out the plan.

Example - The legal capability to implement a requirement to increase the amount of pervious surfaces in new development may already exist in the Conservation Element of the General Plan, in zoning ordinances, subdivision regulations and/or design review requirements.

- A control measure requiring more efficient tillage and plowing practices could have implementation problems from a legal standpoint. One reason for this is that current sediment control legislation exempts tillage and plowing practices for agricultural purposes. On the other hand, fire districts can require discing for fire breaks and an Agricultural Commissioner can order discing of noxious weeds. These two examples are the only "controls" on tillage and plowing practices. To implement such controls would probably require new legislation extending the authority to regulate to some agency or setting up legal incentives such as the grant program administered by the Agricultural Stabilization Service.

Impact Questions:

1. Will existing legal capabilities (such as the following) be sufficient to implement the control measure(s)/alternative plans?
  - a. Local City/County General or Specific Plans
  - b. City and county charter provisions
  - c. Local ordinances or regulations (zoning, subdivisions, grading, etc.)
  - d. Special district - regulations or rules
  - e. State or federal laws
2. Will new laws be required in order to carry out the control measure(s)?  
Response should be given by jurisdiction.

Information Sources:

City and County Attorneys, District Administrators, City and County Planning, Public Works and Public Health Departments, Special Districts.

This information can be found in the ABAG Control Measures Workshop binder and in a document prepared by Sedway/Cooke, "Guide to Implementation Techniques for Air and Water Quality Management Plans."



## Institutional

- o Impacts on the type, level and displacement of public services

## Background

The implementation of alternative plans may impact public service provision. For example, the costs of implementing surface runoff controls may result in less time or money committed to other governmental services. Measuring such impacts is difficult and can only proceed once the implementing and financing mechanisms/options have been developed.

Example - An alternative plan which involves animal litter controls may be implemented through a series of ordinances instituting fines for violations. Initial financing of the enforcement of the ordinance (start-up costs) may occur through a percentage increase in animal license fees. In that case, the additional revenue might "purchase" personnel to enforce the ordinances. An alternative enforcement strategy, might add responsibility to an existing authority (e.g. police). If the added revenues do not offset the costs of any additional personnel required, it is possible that some displacement of other public services might occur (e.g. a fiscal and/or staff decrease in another service department).

The intent of this assessment is to determine if tradeoffs may be necessary to implement the plan, what they might be (type of services provided versus level of services provided versus displacement of one service for another), and whether certain of the shifts in priorities, time and costs might be more acceptable than others.

## Impact Questions:

1. Will the control measure(s)/alternative plan affect the type, level or displacement of any of the following services? Describe the impact in terms of potential money or staff time that would be reallocated.
  - a. Police?
  - b. Fire?
  - c. Health services?
  - d. Sewage collection and treatment?
  - e. Water supply?
  - f. Flood control, drainage, and levee?
  - g. Planning and community or county development?
  - h. Streets and roads building and maintenance, including lighting and parking?
  - i. Libraries, city centers and other public buildings?
  - j. Education?
  - k. Airports?
  - l. Harbors and ports?
  - m. Public transportation?
  - n. Park and recreation facilities?
  - o. Solid waste disposal services?
  - p. Animal control?
  - q. Utility service and regulation?
2. Describe methods for reducing the impacts on the other governmental services.



### Information Sources

City managers, county Chief Administrative Officers and their staffs can provide information on such impacts and possible trade-offs.

Institutional  
o Complexity of implementation

Background

Control measures and alternative plans which require an extremely complex administrative structure for implementation may be viewed with some caution by decision-makers. This would be particularly true if the effectiveness of the strategies were not well known. A complicated set of regulations may result in delays in implementation while the administrative process is designed.

Example - A control strategy to regulate use of chemical fertilizers might involve a permit system. This system could be very complex to implement, particularly if all users (private homeowners, agricultural users, commercial and industrial interests) were to be regulated.

Impact Questions:

1. Will the control measure(s)/alternative plans require a complex administrative process for implementation? If the answer is yes, how would you reduce the complexity of the process?

Information Sources:

Sources include city and county attorneys, district administrators, and staff of city and county planning, public works, and health departments who might be involved in implementation.

Questionnaires, personal or telephone interviews, and roundtable discussions may be useful ways to determine the complexity of the implementation process.

## Institutional

- o Impacts of intergovernmental responsibility and coordination

### Background

Interagency coordination takes place in many forms--formal joint powers agreements, memoranda of understanding, contractual relationships, informal council or staff arrangements, et. al. A control measure/alternative plan that requires the coordination of more than one agency may result in added complexities.

Other procedures in this section identify agencies which have the legal capability to implement control measures/alternative plans (Legal capability), what new or additional legislation, ordinances, charter revisions etc. would be necessary and feasible (Political and organization feasibility), and the complexity of the administrative process required to carry out the plan (Complexity of implementation). This assessment takes that information a step further by identifying the intergovernmental responsibility and coordination aspects of an implementation strategy, problems which could arise and, as a result, changes or alternatives to solve the problems.

Example - A surface runoff management alternative which involved the impoundment of water in upstream channels could conceivably require some form of participation by the following agencies: Army Corps of Engineers, U.S. Fish and Wildlife, State Water Resources Control Board, Department of Water Resources, State Department of Fish and Game, State Land Commission and various city and/or county agencies. An implementation strategy(s) for a management plan may in fact involve only three of these agencies. This assessment seeks to identify the problems with more than one agency implementing a plan (based on past coordination experience, organizational structure differences etc.) and ways to resolve or mitigate the potential problems (including different implementing agencies or mechanisms).

### Impact Questions:

1. Will the adoption and administration of the control measures/alternative plans require coordination with more than one policy body (city council, district board), governmental department or agency? If yes, identify those entities and describe the potential difficulties that may be encountered in intergovernmental efforts.
2. Describe methods for resolving the intergovernmental problems that you identified in Question #1.

### Information Sources:

See information developed using other procedures in this Chapter.

Staff of agencies identified in question 1 should be consulted for current and historic information on interagency working relationships and agreements, for opinions of the difficulties involved in this effort and for mitigation or alternative recommendations. Formal questionnaires, delphi techniques or less structured techniques are ways to elicit responses and can be used in telephone or personal interviews, roundtable discussions, meetings or some combination of these contact methods.

## Institutional

- o Reversibility of decision

### Background

There is a limited amount of quantitative information about the effectiveness of some control measures in reducing surface runoff pollution. Consequently, questions may be raised about the wisdom of making large capital investments or committing substantial operating expenditures for such control measures until more definitive information is available. This assessment should identify the difficulties of reversing a decision to proceed with a particular control measure or alternative plan.

Example - Structural measures are often considered irreversible. Although no action is truly irreversible (e.g. a treatment plant can be disassembled, abandoned, or used as an auxiliary unit; a detention basin can be filled in), the costs of decisions to pursue structural alternatives do not "go away." Those costs may be dollar commitments to pay off bonds issued to finance construction. There may also be opportunity costs or the alternative uses of the resources necessary to implement the measure or plan (e.g. the land for a structural alternative may have an opportunity cost of a baseball field). While the monetary costs are important, the permanence of the alternative solutions is even more important. If a sediment basin could have an alternative use, could be easily filled and the parcel of land used for another purpose, then the decision to implement that control measure is not irreversible.

### Impact Questions:

1. Will heavy capital investments limit the reversibility of the decision to implement the control measure(s)?
2. Will the construction of facilities limit the reversibility of the decision to implement the control measure(s)?
3. Will the establishment of new programs or administrative structures limit the reversibility of the decision to implement the control measure(s)?
4. Are there any other factors which would limit the reversibility of the decision to implement the control measure(s)?

Identify the reasons that the decision to implement a plan or use a control measure would be irreversible. Describe ways to mitigate against the decision being irreversible.

### Information Sources

Sources include staff of implementing agencies.

Questionnaires, personal or telephone interviews and roundtable discussions may be useful ways to determine the reversibility of the decision to use a control measure or implement an alternative plan.



CHAPTER 4  
ECONOMIC CRITERIA PROCEDURES



## Production of Goods and Services

Effect on industrial, commercial, agricultural and service activity

### Background:

The most commonly measured economic effect of an external action is the impact on the production of goods and services. Typically, this impact is estimated by determining the number of jobs that would be affected (increase or decrease) for each category of industry. In the short-term, employee productivity is assumed to remain fairly constant. Therefore, changes in the number of employees will provide an unbiased indicator of changes in levels of production.

The implementation or enforcement of environmental control strategies can affect the production of goods and services in two ways. First, the initial implementation of the control may necessitate the installation of new equipment or modifications to existing equipment and structures.

Example - A control designed to reduce pollution loadings in surface runoff may require industries to construct small berms around machinery so as to capture accidental oil spills during the operation or maintenance of the equipment. Industrial production may be lost during machinery down-time while the berms are being installed but service production (for construction) will be increased.

The second way in which production may be affected by environmental plans is through the operation or enforcement of the control measures.

Example - Some manufacturing industries may have to change certain production practices or alter product lines in order to meet pollution control requirements. Production may also be reduced by the time delays made necessary by permit requirements which slow plant construction or expansion. In some cases, the enforcement of pollution controls may affect the production of goods and services by causing reductions in industrial output or plant closings.

The response of particular businesses to the need to make new capital investment will vary with the type of industry and the magnitude of the investment to projected income streams. The possible responses can be viewed as a continuum. The two extremes of this continuum are clear and the economic impacts are equally obvious. The company which decides to make the necessary changes and continues production will probably have created some short-term job opportunities (employment effect) and incurred some short-term loss in production (wage and salary effect) due to "down time" during the conversion period. The cost of the conversion or changes will be passed on to the consumer (price effect) or taken from company capital (profit effect).

The company at the other end of the extreme may decide to discontinue operation entirely. This decision will cause the elimination of those jobs but the people may be employed by a similar industry which has decided to make the necessary changes and expand to meet the demand for that particular good or service.

The area in the middle of the continuum represents a range of decisions and attendant impacts. Some industries may reduce production in order to reduce pollution; still others may change the factors of production or production processes to meet control requirements.

Economic activity, both basic and local serving (residential) can be classified according to the Standard Industrial Classification (SIC) Code system. Alternatively, basic and residential activity can be estimated using the 21 category breakdown employed in the PLUM and BEMOD models. These models have 14 base and seven local serving components.

Corresponding SIC code numbers are given for each component. Again, the estimates of economic activity impacts are most appropriately made by using change in employment as a measure of the change in production.

#### Impact Questions:

1. Will initial implementation of the Management Plan have an impact on the production of goods and services?\*

\*This will involve estimation of the "start up" costs for implementation of the alternative plan or control strategy. Basically, this will require the estimation of the cost of the construction of new facilities and/or the modification of existing facilities and equipment. Since production effects are measured through their associated employment impacts, the start-up costs will have to be converted into the number of jobs created or eliminated in each category of economic activity.

2. Will operation of the management plan or control measure affect the production of goods and services?

#### Information Sources:

Copies of PLUM and BEMOD projections will be provided to the lead agencies for each county.

U.S. Department of Labor, Bureau of Labor Statistics. The Structure of the U.S. Economy in 1980 and 1985. (1975) Bulletin 1831. Studies by trade councils and industry associations.



## Production of Goods and Services

### Effect on employment, unemployment and underemployment

#### Background:

Jobs may be created, eliminated, reduced in hours, or unaffected by the implementation of strategies designed to reduce pollution from surface runoff. The last section measured the impact of environmental controls on the production of goods and services using the number of jobs affected as the metric of impact. That impact looked at employment by industrial category because it provided an accurate gauge of the effect on the specific industries. This section again requires the examination of impacts on jobs, but here employment impacts will be estimated by job classification.

The commonly used job classifications are those used in the detailed characteristics of the decennial census. Specification of employment and underemployment impacts by job classification is preferred, because it will allow some discussion of the effect of the controls on income distribution and related social and equity issues.

#### Impact Questions:

1. Will jobs be created as a result of the initial implementation of controls?\*

\*Basically this involves the estimation of construction employment or other short-term labor associated with implementation of the alternative plan. Estimates of construction activity may be made on the basis of an engineer's cost estimate for construction alone or on the basis of material for the apportionment of some of the employment to sub-areas of the county or to areas outside the county or the region. Such apportionment is possible with the total construction cost figures but the estimates are necessarily more crude.

2. Will jobs be created by the operation of controls?
3. Will jobs be eliminated as a result of environmental control strategies?\*

\*Estimates of the unemployment caused by environmental control measures should include direct unemployment and the impact on labor force participation.

4. Will some new employment opportunities provide for only part-time employment?\*
5. Will some jobs be reduced to less than full-time work?\*

\*There is little agreement as to the definition of "underemployment". Some sources claim that this should include individuals who are presently working at less than their human potential either because of a general lack of employment opportunities, problems in specific job classifications, or discrimination. For our purposes, however, estimates of underemployment will be limited to individuals who would prefer to work full-time or have been able to secure only part-time employment and would otherwise be without work.

### Information Sources:

Tables will be provided to convert employment shown by industry to employment by job classification.

State of California, Employment Development Department. Area Manpower Review. San Jose Standard Metropolitan Statistical Area, San Francisco-Oakland Standard Metropolitan Statistical Area, Vallejo-Fairfield-Napa Standard Metropolitan Statistical Area, Santa Rosa Labor Market Area (published annually).

State of California, Employment Development Department California Labor Market Bulletin (published monthly), includes information on the labor supply and unemployment.

State of California, Employment Development Department. California Labor Supply and Demand (published monthly).

State of California, Employment Development Department, Division of Employment, Data and Research. Mini-Guide List (list of occupations).

## Income and Investment

### Effect on wages and salaries

#### Background:

Measuring the impact on wages and salaries gives an estimate of the impact of controls on the disposable income or purchasing power of the community. Aggregate wages and salaries can be affected in two ways. First, total wages can be increased if more people are able to find employment.

Example - A control strategy which creates jobs in pollution abatement or removal would tend to increase the total wages in the area through the provision of the new job opportunities.

The second way that aggregate wages and salaries can be affected is through changes in the wage rates for individual workers.

Example - A street sweeping program for pollution control may involve the conversion of manual sweeping practices to mechanical operations. Existing personnel who upgrade their skills and become proficient at operating the mechanical cleaning apparatus will generally receive an increase in salary commensurate with their increased skills. This will have the effect of increasing aggregate salaries.

Following the estimation of employment on the basis of job classifications, total salaries can be estimated using the average wage for each job classification. However, if employment has only been estimated on the basis of the standard industrial classification codes, then salaries must be estimated using the average wage rates for each industrial classification. This is necessarily less accurate as it will involve considerable averaging across job classifications (e.g., administrator, clerical, operatives and laborers) within each category of industry.

#### Impact Questions:

1. Will changes in overall employment affect total salary levels in the area?
2. Will wage rates change as a result of management plan implementation or operation?
3. Will wage rate changes affect particular categories of employment or groups of individuals?

#### Information Sources:

State of California, Employment Development Department. Earnings and Hours, California and Metropolitan Areas (published annually).

## Income and Investment Effect on rents

### Background:

Some control measures may require that property owners make modifications to their structures in order to reduce the amount or strength of pollutants in surface runoff.

Example - In the case of rental property, the new cost will generally be shifted to the leasee in the form of higher rents. The amount of the rental increase will depend on the relative magnitude of the renovation cost, the total property value, and the rental rate.

In some cases, the owner of rental property will not be able to shift the cost of property renovation to the consumer of the property.

Example - This would happen when the proposed rate increase is large in comparison to the prevailing rate--not all property owners are faced with the need to renovate, and the vacancy rate is sufficiently high to allow tenants to relocate. If this type of competition in the rental market exists, then the property owner may have to delay or forego the rate increase and absorb a portion of the renovation cost in the form of decreases in rental income.

### Impact Questions:

1. Will management plan implementation cause changes in rental rates?
2. Will environmental management plans cause changes in rental income?
3. Will certain types of property be particularly affected?

### Information Sources:

U.S. Department of Commerce, Bureau of the Census. Detailed Housing Characteristics, California.

Real Estate Research Council of Northern California, Northern California Real Estate Report.



## Income and Investment

Effect on capital investment for new and replacement facilities or equipment

### Background:

The necessity for private capital investment will depend on the control measure and the method of implementation. Private capital investment for new or replacement equipment and facilities may be required directly by legislation and regulation or indirectly through changes in emission standards and allowable practices.

- Example - Control measures may require private businesses to install specific controls to reduce the volume of runoff or the amount of pollutants from the business site. These controls could include the installation of storm water storage facilities on roof tops or pervious surfacing material on parking lots.
- Control measures could establish limits on the amount or rate of surface runoff from private business sites. The limits could be set so that the volume or speed of the runoff during a storm would have to be the same as they were prior to the construction of the business structure. To achieve this limitation, businesses would have to invest in runoff controls.

It is likely that the requirement for capital investment will affect firms and may cause production or employment impacts. Some capital investment may be required on residential, owner-occupied property. However, this will be identified as part of the effect on housing costs. (See Social Criteria Chapter.)

The capital investment may generate secondary impacts. The investment required could cause an increase in the prices of consumer products or a decrease in company profits. The specific impact will depend on such factors as the competitive nature of the industry, the price elasticity and cross-elasticity of demand, and the relative cost of the capital investment. These secondary impacts should be considered when the assessments of prices and profits are made.

### Impact Questions:

1. Will the implementation or operation of control strategies necessitate private capital investment?
2. Can the affected individuals or firms be identified?
3. Can secondary impacts be identified?

### Information Sources:

Pollution control equipment manufacturers and distributors. Appraisal Department, Bank of America, San Francisco Real Estate Council of Northern California. Northern California Real Estate Report.

## Income and Investment Effect on profits

### Background:

Generally, a business will shift the costs of environmental controls to the ultimate consumer of the goods or services provided by the company. Thus, the company's profits would be unaffected. However, certain environmental control strategies can affect the profits of private companies through natural market factors.

There are two cases when a company's profits might be reduced as a result of environmental controls. In the first case, the increased costs cannot be shifted to consumers because of competition from other suppliers.

Example - A manufacturer may have to make a capital investment for modifications in the production process to reduce pollution emissions. However, competition from manufacturers of similar or substitute products may prevent the manufacturer from raising prices to cover these increased costs. Therefore, profits will be reduced.

In the second case, the company does raise the prices of their good or service, but the resulting decline in sales volume causes a reduction in profits.

Example - A manufacturer may construct a berm around machinery to prevent leaking fuel or lubricant from reaching the plant's floor drain. The firm intends to cover the cost of the expenditure by increasing the price of the products. However, if the goods produced by the firm are price elastic, a 1% increase (decrease) in the price will be followed by a decrease (increase) in the quantity of the goods purchased of greater than 1%. But such a change would also cause a decrease in the overall revenue to the firm.

### Impact Questions:

1. Will the control measure affect the profits of private firms?
2. Will profits be reduced?
3. Will identifiable companies or types of firms be affected?

## Consumer Expenditures

### Effect on the prices of goods and services

#### Background:

Generally, the price of goods and services will reflect the costs of doing business. This price will include the cost of labor, materials, and a fair return on the capital invested in the enterprise. If manufacturers, distributors, or sellers have to incur extra costs as a result of pollution control measures, these costs will usually be passed on to the ultimate consumer of the goods or services in the form of higher prices.

Example - A firm is required to install roof-top detention systems to reduce and slow the flow of runoff during a storm. The cost of the system is amortized and the annual expense is added to the price of the products produced by the firm.

- A retailer is required to install catch basins below the customer parking facility to reduce the pollutants which enter the storm sewer system. The cost of this improvement and the maintenance of the basin between storms is routinely included in the price of the goods offered for sale by the retailer.

Naturally, if the prices of goods and services increase, consumers will have to pay more to obtain necessities as well as luxury items. This can have significant equity implications because lower income peoples must, by definition, pay a larger percentage of their incomes for basic necessities. Thus, increases in the prices of necessity goods will more adversely affect consumers with low incomes than those with medium or high incomes. These equity impacts, if any, should be noted as part of the impact on the equity criteria.

#### Impact Questions:

1. Will the prices of goods and services change as a result of the implementation or operation of environmental management plans?
2. Will particular goods and services be affected?
3. Will increases or decreases in consumer prices affect special population groups?
4. Will changes in the prices affect the consumption of substitute products or services?

#### Information Sources:

California State Board of Equalization. Taxable Sales in California (published quarterly).

U. S. Department of Labor, Bureau of Labor Statistics. Three Budgets for an Urban Family of Four Persons, 1969-70. BLS-Supplement 1570-5.



## Consumer Expenditures

### Effect on consumption of goods and services

#### Background:

The quantity of goods and services purchased by consumers may be both directly and indirectly affected by the implementation of environmental controls. Consumption could be directly affected by prohibiting or restricting the sale and use of certain goods and services.

Example - An environmental control which restricted the sale and changing of automotive motor oil to only areas where the used oil could be stored safely for reclamation and reuse (e.g., service stations) would directly affect the amount of bulk motor oil which is purchased for personal use.

Consumption could be affected indirectly by changes in the price of the product. The quantity of a good or service which is purchased will respond to changes in the price of that good or service. Generally, the quantity demanded will increase (decrease) as the price of the product is decreased (increased).

Example - If the price of garden care products (e.g., fertilizers, insecticides, herbicides, etc.) is increased through a tax to cover the cost of removing the residue of these products from surface runoff, then the amount of those products that are sold can be expected to decrease. Basically, some of the former consumers of those products will switch to other methods of controlling pests and weeds or switch to less polluting products.

#### Impact Questions:

1. Will the consumption of goods and services be affected by the implementation or operation of environmental management plans?
2. Can specifically affected goods and services be identified?
3. Will changes in consumption patterns affect particular industries?
4. Will changes in consumption patterns affect particular population groups?\*
5. Will substitute goods or services be affected?

#### Information Sources:

U.S. Department of Labor, Bureau of Labor Statistics, "Annual Consumption Costs for Urban Family of Four", Autumn, 1972.

\*See special population groups identified through the Equity procedures in the Social Chapter.



## CHAPTER 5

### SOCIAL CRITERIA PROCEDURES



## Housing Supply

### Effect on existing housing stock

#### Background:

In addition to the importance of housing as a basic human need, the economic and social impacts of provision of housing affect large numbers of people both directly and indirectly. Regional housing goals seek to maximize free choice in housing, conserve the existing housing supply in accordance with housing needs, and expand the housing supply in accordance with housing needs. Control measures may impact existing housing by affecting activities associated with conservation and/or rehabilitation (quality and supply), by affecting housing costs, or by affecting accessibility to housing by various economic groups of the community.

- Example - Control measures such as control roof drains, insure proper operation of septic tanks, buffer strip requirements near streams could affect existing housing maintenance activities. If specific--septic tanks must be pumped out every two years--the cost per household could be determined.
- Control measures such as more frequent street sweeping and litter ordinances may be financed by special assessments of property/home-owners. This could affect maintenance costs and could be passed along as increased rental rates.
  - Control measures which regulate construction schedules and control erosion at construction sites may delay or otherwise constrain re-development plans.

#### Impact Questions:

Would the control measure have an impact on:

##### A. Existing Housing Quality and Supply

1. individual homeowners' maintenance and rehabilitation activities (includes property maintenance)?
2. neighborhoods/residential areas from the standpoint of housing maintenance and rehabilitation activities?
3. housing supply due to constraints on conversion or demolition activities or plans?
4. housing supply resulting from demolition and relocation activities required for control measure implementation?
5. existing low- and moderate-income housing supply?
6. the potential for (or any plans for) existing housing to be converted (use intensified) to supply low- and moderate-income housing needs (e.g. redevelopment plans)?

## B. The Cost of Existing Housing

1. property values?
2. maintenance and rehabilitation costs?
3. the costs of housing as affected by the costs of public services to residential areas?
4. the costs of units now inhabited by low and moderate income households?
5. costs of housing for low and moderate income groups as a result of relocation associated with control measure implementation?
6. rental rates? (See Economic Chapter - Effect on Rents)

## C. Financial Investments in Neighborhoods

1. interest rates established by financial institutions for home improvement loans?
2. interest rates established by financial institutions for mortgage insurance?
3. individual(s) financial investments in property? (This is closely related to A. 1 and 2 and may also be affected by the interest rate impacts outlined above)
4. participation in neighborhood rehabilitation by city/state rehabilitation programs?
5. state efforts to implement anti-redlining regulations?

Many of the above impacts are extremely difficult to quantify due to their dependence on locational, control measures (material and labor), implementation, and individual and community specific inputs. Quantification would also be dependent on a regional market analysis beyond the scope and resources of this undertaking. It is possible, however, to qualitatively discuss the potential impacts of a control measure(s) on quality, supply, cost and investments for existing housing stock. All of these factors will ultimately manifest themselves as impacts on neighborhoods or communities and on individual choice and housing opportunities.

### Information Sources:

City and County Planning Departments, Housing Authorities, Building Code Enforcement Offices, Public Works Departments, County Assessors, Housing Elements of General Plans, Housing Assistance Plans. See also sources in Financial Criteria Chapter, ABAG Urbanization and Development Division.

Estimates of Housing Needs: San Francisco Bay Area, 1970, ABAG, 1973; Toward Strategies for Conserving the Region's Housing Element: San Francisco Bay Area, ABAG, 1975; Detailed Housing Characteristics, California, Bureau of the Census; Northern California Real Estate Report, Real Estate Research Council of Northern California.



- \* Where a control measure would affect maintenance and rehabilitation activities, increase existing housing costs or otherwise impact existing residential area profiles, discuss the impacts on the neighborhood/community under Sense of Community and Equity.
- \*\* See control measures impacts identified in Institutional and Financial section (especially Fiscal effects on local government and Impact on public services) for the effect of those impacts on these issues.

## Housing Supply

### Effect on new housing stock

#### Background:

Regional housing goals seek to maximize free choice in housing, conserve the existing housing supply in accordance with housing needs, and expand the housing supply in accordance with housing needs. Control measures may impact new housing (supply and/or cost) as a result of restrictions and standards affecting construction activity and development locations.

Example - Control measures such as regulate construction schedules and control development patterns could affect the timing of new housing starts as well as the number of units and the location of new development.

#### Impact Questions:

Would the control measure(s) have an impact on:

##### A. Housing Supply\*

1. the overall number of housing units that could be constructed in the area of impact? (Regardless of type)  
  
This could be especially important where there is already a short supply in regard to demand.
2. the location(s) where new housing units could be constructed?
3. the kind of new housing units that could be constructed (e.g., size, rent/own, condominiums, cooperatives, quality and amenities)?
4. the density of new housing units that could be constructed in a given area?
5. the timing of new housing starts?
6. the amount of low- and moderate-income housing that could be constructed?  
  
This could be especially important where there is already a short supply in regard to need for such housing.
7. the amount of housing that could be constructed by adding another regulation/permit that may result in denial of construction permits?

These questions are intended to identify the effects on housing supply which are a function of the control measure. The first step in responding to these questions is consideration of the local zoning ordinances, subdivision regulations, building codes, capital improvements programs and

growth and development policies of the general/comprehensive plan (see also the results of the local policy survey conducted by each county for this management planning effort), housing authority plans, housing assistance plans. All of these factors serve to affect the housing supply in an area. The impacts on supply attributed to a control measure should be distinguishable from these controlling factors. However, impacts on supply could also result from adding to existing regulations or constraints (e.g., additional requirements implemented through subdivision regulation revisions). Any impact on existing housing supply plans (e.g., housing/redevelopment authority plans) should be discussed specifically. Impacts identified in the sections - Institutional and Financial and Economic - may also affect housing supply and should be discussed here.

## B. The Cost of Housing\*

### 1. the cost of land?

Control measures such as slope density standards, maintain open space and requirements for minimum amounts of pervious surface could reduce by some increment the total amount of land that could be developed in residential uses. Holding all other factors constant, we would assume that the effect would be higher land prices for the remaining developable land. However, in reality, many factors could mitigate against this typical supply-demand response. For example, the way in which the control measure would be implemented could offset price increases. If densities were increased in conjunction with requirements for minimum amounts of open space and pervious surface in a development, then the number of units that could be constructed would not decrease. This could forestall land price increases.

### 2. the cost of site preparation?

Consideration must first be given to those site preparation requirements which currently exist or would be undertaken regardless of the control measure. If the control measure would add a substantial new site preparation activity, the costs might increase. One way to determine the tendency for control measure requirements to affect the costs of site preparation would be to contact several developers to seek their general opinion as an input to the impact discussion.

### 3. the cost of construction?

Determination of the potential for construction costs to increase or decrease would be influenced by existing construction activity requirements. Control measure requirements in excess of existing ones could increase costs. However, if the new requirements are small, compatible increments to existing requirements, do not require substantial capital outlays etc., the costs may not be affected. Again, consult with some representative developers for general reactions to new requirements.

4. the costs of housing units?

Considering the supply impacts identified, the above cost effects, the specific characteristics of the control measure and its implementation, it should be possible to indicate a general tendency for a control measure to have an impact on the cost of housing. Note that the cost of housing may be affected by the time and dollar costs to developers which result from processing applications and permits and development fees. Consideration should also be given to potential effects on interest rates, mortgage rates etc., and the impacts of those factors on the cost of housing. To the extent possible, the range of housing types that might be impacted should be identified (especially the effects on the costs of low- and moderate-income housing units).

5. Since in the long run all costs are passed on to the consumer in paying the cost of the housing unit, could the control measure(s) add enough costs to ultimately rule out a housing development by making it unmarketable?\*

Information Sources:

County/City Planning Departments, Housing Sections, County Assessors' Offices, Housing Authorities, See also Information Sources in Financial Criteria Chapter.

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\* See control measure impacts identified in Institutional and Financial section for the effect of those impacts on new housing supply and cost.



## Physical Mobility

- o Impact on public transportation
- o Impact on private transportation

### Background:

Physical mobility plays an important role in the range of choices available to people in housing, jobs, recreational opportunities and social service provision. Physical mobility is a function of both pedestrian and vehicular mobility. Control measures may impact physical mobility in several ways. Mobility disruption may result from construction or operation and maintenance activities associated with control measures. Control measures which affect development patterns may result in long term effects on physical mobility and the range of choices noted above.

Example - Redesign of curbs and gutters could affect mobility (both vehicular and pedestrian) as a result of the equipment used and the construction activity.

### Impact Questions:

Several control measures involve construction or operation activities of a single event or intermittent nature (e.g., redesign of curb and gutters, street cleaning). Although their impacts may be localized or short term, the disruption in public and private mobility may be significant. For the purposes of this assessment procedure, transportation systems include both public and private modes (vehicular and pedestrian) and integral components such as sidewalks, streets, parking lots etc.

Would the control measure(s) have an impact on:

1. travel time?  
(The potential for changes in average driving speed can be considered where the impact is likely to be localized.)
2. travel patterns?  
(Any inconvenience - travel time, congestion etc. - is likely to result in traffic pattern shifts either to other paths or other modes.)
3. performance and efficiency of the transportation system?  
(Changes in travel time and patterns could affect the performance of the system especially from an efficiency standpoint.)
4. interfacing of modes of transportation?  
(The potential for travel time changes - speed, congestion - to affect connections could create problems for mode interface. Travel pattern disruption, blockage or alteration could also affect mode interface.)
5. accessibility to the transportation system?  
(Congestion, travel pattern blockage or shifts may limit accessibility to the system.)

6. accessibility from the transportation system to destination?  
(The potential for disruption in travel patterns and time, availability of parking and mode interface impacts can affect the ability of people to move from the system to their destination - work, shopping, residence etc.)
7. traffic hazards? (An increase or decrease in actual or perceived traffic hazards may curtail street and sidewalk usage, recreation and other outdoor activities. Use a scale - much greater, somewhat greater, same, somewhat less, much less - to describe the hazard change associated with or resulting from the control measure.)

Information Sources:

County/City Planning Departments, ABAG, MTC, City Traffic Engineers.

## Health and Safety

### Effect on public health

#### Background:

Control measures may create or eliminate health or safety hazards as a result of their design and/or operation and maintenance characteristics. The potential for impacts on public health and safety are to some extent dependent on location and implementation strategies.

Example - Removal of debris in channels and inlets would improve flow and could also eliminate a source of public health hazards in the form of rats, mosquitos and other disease carrying vermin. The reverse could be said for control measures such as detention basins if uncovered and if the water stagnates before release into the drainage system or stream.

#### Impact Questions:

Would the control measure(s):

1. result in the creation of man made hazards to public safety?

Consideration should be given here to construction activities which could pose hazards to the public - for example, during construction of detention basins water filled "holes" would be a safety hazard especially as a drowning accident risk for children.

2. create hazards to public health?

- a. create conditions conducive to the propagation of noxious\* species of plants?
- b. create conditions conducive to the propagation of noxious\* species of animals?

3. eliminate hazards to public health?

- a. eliminate conditions conducive to the propagation of noxious\* species of plants?
- b. eliminate conditions conducive to the propagation of noxious\* species of animals?

Consideration should be given to the creation of appropriate conditions for water stagnation and resultant disease carrying insect propagation, conditions conducive to disease carrying vermin etc.

#### Information Sources:

County/City Health Departments, Local Building Code Enforcement Officers

\*For this task, noxious is defined as those species which are/can be physically harmful to humans (e.g. rats, insects) or otherwise destructive to living beings.

## Health and Safety

### Effect on site hazards

#### Background:

Floods, earthquakes, landslides, mudslides, land subsidence and other earth features and processes pose potential hazards to public safety. Lack of consideration or ignorance of the hazard or constraint posed by such phenomenon results in large amounts of property damage and loss of life and consumes vast sums of money for disaster relief and property maintenance.

Control measures may reduce the relative risks of exposure of the populations to natural hazards by attenuating runoff levels and thereby affecting flood frequency and peaks. Control measures may control activities or recondition areas with resultant reductions in mudslide susceptibility. Conversely, control measures may exacerbate hazard conditions if structural implementation occurs in or ignores risk areas and conditions. Control measures which affect development patterns may result in development pressures in risk areas.

Example - Control measures which involve construction of facilities (treatment facilities) should not be sited in floodplains or other areas with site hazards.

- Control measures such as slope density standards, open space may have beneficial effects of precluding construction in areas with site hazards.
- Control measures such as increase perviousness of surfaces and requiring minimum amounts of pervious surface for new construction may reduce flood risks and levels. Other control measures such as stabilize and redesign channels could heighten downstream flooding and flood risk problems.

#### Impact Questions:

Would the control measure(s):

##### A. Flood Risk Impacts

1. affect flood frequency?
2. affect flood peaks?
3. affect flood velocity?
4. affect (increase/decrease) the amount of land/numbers of people threatened by flooding?
5. affect (increase/decrease) the likelihood of development in flood hazard areas\*?
6. involve facility construction in flood hazard areas\*?

\* Flood hazard areas include floodplains and areas subject to inundation by tsunamis and dam, dike or levee failures.



## B. Seismic Risk Impacts

1. involve facility location in or adjacent to areas of identified seismic hazards\*?
2. affect (reduce/increase) the likelihood of development in seismic risk areas\*?

\*Seismic hazard areas include areas subject to liquefaction (e.g. Bay mud), areas on or near fault zones, and areas of shaking amplification (e.g., Bay mud).

## C. Landslide/Mudslide Risk Impacts

1. involve facility location in or adjacent to landslide or mudslide risk areas?
2. affect (reduce/increase) the likelihood of development in areas susceptible to landslides or mudslides?
3. affect the susceptibility of areas to serious erosion and/or mudslides?

## D. Land Subsidence/Expansive Soils/Settlement Risk Impacts

1. involve facility construction in areas with identified bearing material or foundation problems?
2. affect (reduce/increase) the likelihood of development in areas with identified bearing material or foundation problems?
3. affect activities which result in (cause) land subsidence?

## Information Sources:

U.S. Geological Survey, U.S. Department of Housing and Urban Development, Soil Conservation Service, California Department of Water Resources, ABAG Land Resources Division, City and County Planning Departments, Public Works Departments, Flood Control Districts, Corps of Engineers.

Flooding: "Flood Prone Areas in the San Francisco Bay Region, California," USGS/HUD, San Francisco Bay Region Environment and Resource Planning Study, 1973 (maps); "General Area Subject to Salt Water Flooding," in Summary of a Report to the Santa Clara County Flood Control and Water District on the Baylands Salt Water Flood Control Planning Study, 1973; California Flood Hazards Maps, Division of Mines and Geology, 1970; Corps of Engineers maps and data; HUD - National Flood Insurance Program Maps.

Seismic Risks (Landslides and Tsunami Information also): Seismic "Special Studies Zones Maps" (faults), Division of Mines and Geology; Seismic Prediction of Maximum Earthquake Intensities for the San Francisco Bay Region, USGS Miscellaneous Field Studies Map; USGS/

HUD San Francisco Bay Region Environment and Resources Planning Study (maps), 1970-76 "Liquefaction, Flow and Associated Ground Failure," USGS circular 688; "Maps of Fault Zones and Earthquake Epicenters and Map of Land Subsidence in Santa Clara Valley", Water Quality Control Plan Report Vol. 2, San Francisco Bay Region, SWRCB and RWQCB, 1975; "Crustal Strain and Fault Movement Investigation: Faults and Earthquake Epicenters Bulletin 116-2 Jan 1964 California Department of Water Resources; Geologic and Engineering Aspects of San Francisco Bay Fill, Goldman, H. E. (ed), Division of Mines and Geology Special Report 97, 1969.

Erosion: "Erosion Activity", Division of Mines and Geology Map; "Soil - Vegetation Maps," State Division of Forestry; Soil Conservation Service Soils Maps (with use ratings); USGS/HUD San Francisco Bay Region Environment and Resources Planning Study (maps), 1970-76.

## Sense of Community

- o Effect on community character
- o Effect on community stability

## Background

A community is not necessarily geographically distinguished by size or population. Generally, it is defined by a set of characteristics that result in a sense of belonging and identify among residents. The concept of a sense of community is one aspect of social impact assessment which focuses on the quality of life from other than an economic or material well-being perspective. Because people live in communities (neighborhoods, towns, cities), it is important to identify the effects of proposed actions on their sense of community.

The most obvious effects of a control measure on the sense of community would result from construction related impacts when displacement of residents occur and/or a change in the quality of a neighborhood or community occurs. Control measures may also result in changes in composition of a neighborhood which could affect community character and stability.

Many factors which contribute to a sense of community have been assessed elsewhere (e.g., institutional impacts such as government operations and services, economic impacts, housing impacts, amenity impacts etc.). This assessment procedure seeks to identify the cumulative effects of a control measure/alternative plan as an impact on the sense of community.

## Impact Questions:

Would the control measure(s) have an impact on:

1. the character of a community (neighborhood, town, city) in terms of the distribution or concentration of income, ethnic, racial or age groups? (See Equity procedure)
2. the continuity of social and economic compositions and relationships? (This is a function of impacts on physical structures as well as on social interaction opportunities such as recreation areas and opportunities, shopping opportunities, accessibility and other physical mobility concepts, quality and cost of new and existing housing etc.)
3. the character of the community in terms of residents' sense of well-being and satisfaction with physical, social and symbolic characteristics? (e.g., visual quality, area cohesiveness, accessibility, crowdedness, sense of identity, homogeneity and diversity, historic and cultural resources)

## Information Sources:

City Planning Departments, for neighborhood studies, Citizen Participation staffs. The citizen participation process developed for each county should provide excellent opportunities for input from citizens on their perceptions of the impacts of control measures and alternative plans on community character and stability.



## Equity

- o Impact on individual opportunity and lifestyle
- o Impact on special population groups

## Background

An early commitment was made to identify, to the extent possible, the equity effects of alternative management plans. Of concern to citizens is the issue of who benefits and who pays as well as the effect on individual lifestyle and opportunity.

Many of the impacts identified in the four major categories - Environmental, Institutional and Financial, Economic and Social - have equity effects. This assessment seeks to identify the impacts of control measures/alternative plans on special population groups.

Example - If the control of roof drains involved a code enforcement program in specific areas to insure that all runoff drained to pervious surfaces and/or the storm drainage system, any special population groups that would be affected should be identified.

Financing an alternative management plan with some assessment technique in implementation area(s) would affect residents of those areas.

## Impact Questions:

Would the control measure(s) have an impact on:

1. individual opportunity and lifestyle?
2. special population groups?
  - a. aged
  - b. youth
  - c. ethnic minorities
  - d. women
  - e. low income
  - f. handicapped people
  - g. individuals with special employment problems

## Information Sources:

An ABAG staff member developed an approach which can be effectively used to assess the impacts of control measures and alternative plans on special population groups. Its main tools are maps and descriptive information about the maps. The maps delineate the "social areas" of the nine county Bay region. These areas are not political jurisdictions (Oakland, Redwood City, Napa, San Jose). These 96 areas are defined on the basis of social indicators.



The 96 "social areas" are the end result of several steps taken to describe the residents of the Bay Area and the overall social profiles of these areas. Census information provides a large number of variables or descriptive terms about an area. Many of those variables give us redundant information even when the number of variables is digested down into summary characteristics. For example, if we mapped each summary characteristic or indicator and compared maps, we would see that many maps/variables could be grouped. This was in fact done with statistical methods. The indicators grouped together in seven ways resulting in seven summary social indicators: affluence, stage-in-family-life-cycle, poverty, women in labor force, chicano subpopulation, asian subpopulation, and group quarters. These indicators were then used to classify each census tract. Following that, tracts were grouped as follows: two tracts were compared; if their characteristics were similar, they were grouped; otherwise they remained separate. This process continued until no further aggregation could occur. The aggregation was controlled by a "geographical constraint" which rejected tracts for aggregation if they were not contiguous. It was aided by a technique developed by staff which allowed the 1,042 tracts to be objectively aggregated.

Each county will receive a map of its "social areas" defined as explained above. Information profiling each "social area" will also be supplied. Once the area where a control measure/alternative plan will be implemented is decided, it will be possible, using these maps, to assess which "areas" will be affected and what special population groups will thereby be impacted.

The public participation process developed for each county should provide excellent opportunities for input from citizens on their perceptions of impacts on individual opportunity and lifestyle.

## Urban Patterns

- o Location of development
- o Density of development
- o Type of development
- o Timing of development

## Background

The assessment of control measure and alternative management plan impacts on urban patterns presents a unique situation. Other assessment procedures have concentrated on establishing cause-effect relationships between control measures and assessment factors and identifying one or two resultant effects (e.g., impacts on physical resources and subsequent production and employment impacts). With urban patterns, the network of impact is much more extensive.

The physical form (including factors such as location, density, type, timing and amount) in which development occurs and is created has a significant impact on a wide array of factors and on resources necessary to accommodate growth. The environmental, economic, institutional and social impacts of development induced, accommodated or displaced by a plan or project often prove to be the most significant effects, especially in the long run.

The identification of impacts on urban patterns will be most critical for regional assessments. The local assessment should focus on identifying the impacts of specific control measures and alternative plans through the questions provided.

Example - Regulation of construction schedules will affect the timing of development and will also impact the amount, location, density and type of development.

- Control development patterns will obviously affect all of the components of urban patterns--location, density, type, timing and amount.

## Impact Questions:

Would the control measure(s) have an impact on:

1. the location of development?

Indicate areas where development (residential, commercial, industrial) would be limited as a result of a control measure and the amount of development affected. Indicate whether these impacts would encourage growth contiguous to existing urban areas, in existing urban areas or in relatively undeveloped areas.

2. the density of development?

Indicate the densities that would be accommodated or restricted by the control measure(s), where the density limitations would occur and the amount of development affected. For example, a regulatory control measure might restrict density to  $\leq 2$  Du/acre on slopes  $\geq 15\%$ .

Identification of location impacts should be fairly straightforward. The difference between existing slope density controls for that area and those imposed by the control measure would constitute the predicted impacts. For example, if existing standards are  $\leq 4$  Du/acre on slopes  $> 15\%$ , then the new standard of  $\leq 2$  Du/acre results in a net potential decrease of 2 Du/acre. If there are 100 acres of  $> 15\%$  slope zoned single-family which could be developed then the new controls would mean that 200 fewer housing units could be constructed.

3. the type of development?

Indicate the impact on type and amount of development (residential-single family and multi-family, commercial-retail and office, and industrial). Density impacts may also affect the type of development. The type of development includes the form development takes (e.g., PUD vs sprawl, shopping centers vs strip commercial, industrial park vs single site industrial) and where it occurs (contiguous to existing urban areas, in urban areas, or in relatively undeveloped areas).

4. the timing of development?

Indicate the impacts on when development occurs. Construction schedule controls would have an obvious effect on timing. Timing impacts could also affect the amount of development, the type of development, and the location of development.

Responses to these questions require consideration of existing development controls such as zoning ordinances, subdivision regulations, building codes, capital improvements programs (and undeveloped areas with existing infrastructure), special zones (e.g., agricultural preservation zones), general plans and local developments plans and policies (see information from local policy survey conducted in each county for this planning effort).

Information Sources:

City/County Planning Departments, Public Works Departments, Building Permits Offices, Utilities Agencies, ABAG Provisional Series III Projections.





## APPENDIX



# ASSESSMENT/EVALUATION PROGRAM

## ASSESSMENT CHECKLIST

### TECHNICAL MEMORANDUM NO. 1

November 1976

#### Background:

Assessment/Evaluation is a process conducted as the environmental management plans are developed. Assessment concentrates on the development of information about the potential impacts of alternative plans. Evaluation involves the use of the impact information by decision-makers in selecting the preferred alternative plans.

The goal of the assessment process is to compile information on a full range of effects that might be associated with control measures and alternative plans. The Assessment Checklist is the first step in realizing that goal. The Checklist, developed with the aid of public input, represents factors considered to be important in assessment/evaluation of pollution control measures. The second step in the assessment process involves identifying potential impacts of particular control measures using the Checklist factors in a matrix analysis. The third step involves developing a procedure to predict the nature and extent of the impact. The impact information is then displayed in summary form (with full back-up documentation) for evaluation by decision-makers.

#### Assessment Checklist Clarification

Assessment factors are organized into four broad categories -- Environmental, Institutional and Financial, Economic and Social. There is no implied weighting of importance in the organization nor are the categories mutually exclusive. The overlaps and interrelationships across categories cannot be reflected in a list merely displaying the types of potential impacts that could be studied. The assessment procedures will identify such interrelationships.

The Assessment Checklist also serves as one part of a screening mechanism. The major categories and subcategories of the Checklist can be related to the candidate control measures in a matrix analysis. The matrix analysis shows cause-effect relationships, screens out the number of criteria affected by a control measure, and directs the assessment of alternative plans.

When viewing the Assessment Checklist, these points should be kept in mind:

- 1) Not every factor will be used to assess every control measure or alternative plan.
- 2) Assessment procedures will incorporate both qualitative and quantitative impact methods and data.
- 3) The impact information will include a discussion of the reliability of the data and all assumptions used in the assessment procedures.

ASSESSMENT CHECKLIST

I. ENVIRONMENTAL CRITERIA

A. Air Quality

1. Federal standards for air quality

- Total suspended particulates
- Carbon monoxide
- Photochemical oxidants
- Hydrocarbons
- Sulfur dioxide
- Nitrogen dioxide

2. State standards for air quality

- Lead
- Sulfate
- Hydrogen sulfide
- Ethylene
- Visibility reducing particulates

3. Other air quality considerations

- Ozone depletion
- Odor

B. Surface and Ground Water Quality and Quantity

1. Effect on beneficial uses

- Municipal and domestic supply
- Agricultural supply
- Industrial process supply
- Industrial service supply
- Goundwater recharge



- Freshwater replenishment
- Navigation
- Hydropower generation
- Water contact recreation
- Non-contact water recreation
- Ocean commercial and sport fishing
- Warm freshwater habitat
- Cold freshwater habitat
- Preservation of areas of special biological significance
- Saline water habitat
- Wildlife habitat
- Preservation of rare and endangered species
- Marine habitat
- Fish migration
- Fish spawning
- Shellfish harvesting

2. Water quality objectives have been set forth in the Basin Plan (Water Quality Control Plan, San Francisco Bay Basin) to protect the beneficial uses of surface and ground waters. These objectives have been accepted by State and Federal agencies. The assessment process will involve the estimation of the effects of alternative environmental management strategies with respect to these water quality objectives and other policies.

3. The assessment process will also involve the estimation of mass emission rates of pollutants. These emissions will include:

- Organic material
- Nutrients
- Sediments and other suspended solids
- Disease causing organisms

- Floating material
  - Heat
  - Radioactivity
  - Heavy metals and other toxicants
  - Chemical constituents
4. Effect on surface and ground water quantity
- Impact on surface water supplies and requirements for water importation
  - Impact on groundwater table
    - Changes in safe yield
    - Subsidence

#### C. Physical Resources

1. Effect on flora and fauna
- Impacts on desirable, unusual, rare, or endangered species
  - Impact on plant species which provide cover and food for important wildlife species
  - Effects upon noxious species of plants or animals
2. Effect on the supply of critical land-related resources
- Impact on prime or unique agricultural lands
  - Impact on other agricultural lands
  - Impact on mines, quarries, and mineral-bearing lands.
  - Impact on timber-producing and other forested lands
  - Impact on salt ponds
  - Impact on geothermal sites
  - Impact on wet lands, marshes, coastal zones, and estuaries
  - Impact on wildlife habitat
  - Impact on hilly land, fragile land, or land subject to erosion

3. Effect on land sites with special development characteristics
  - Effects upon lands uniquely suited for seaport, airport, marina, or energy site development
4. Effect on recreation use or potential
  - Impact on actual or potential recreation sites (e.g., parks, beaches, stadia, etc.)
  - Impact on recreation use
5. Effect on solid waste
  - Impact on solid waste volume
  - Impact on resource recovery
  - Impact on hazardous materials

D. Energy

1. Effect on energy consumption/demand
  - Impact on natural gas consumption
  - Impact on electricity consumption
  - Impact on petroleum consumption
  - Impact on coal or other non-renewable energy resource consumption
2. Effect on energy conservation/supply
  - Impact on efficiency in the use of energy
  - Impact on energy use
    - Peak energy use
    - Off-peak energy use
  - Impact on resource recovery and recycling
  - Impact on energy production as a by-product of residuals management
  - Impact on solar energy production

## E. Amenities

### 1. Effect on visual amenities

- Preservation of scenic areas, the natural state of the environment, and open space.
- Height and bulk of structures required for or affected by the plan
- Visibility impact of clean air
- Appearance of urban landscape

### 2. Effect on historic and cultural resources

- Impact on historic landmarks, monuments, districts, archaeological sites, and other areas of historic or cultural significance
- Impact on sites with special water-related historical significance

### 3. Effect on noise

- Impact and location of transportation noise
- Impact and location of construction noise
- Special noise problems due to pollution reduction activity (e.g., trash collection, street sweeping)

### 4. Effect on odor

- Impact on type, strength, location and duration of odors

## II. INSTITUTIONAL AND FINANCIAL CRITERIA

### A. Financial

#### 1. Direct costs of implementation

- Capital and replacement costs
- Operating/maintenance costs
- Administrative costs
- Costs of regulation, inspection, and enforcement



2. Fiscal effects on local government (assuming constant levels of State or Federal assistance)
  - Impact on general obligations, revenue or special assessment bonds and bonding capacity
  - Impact on property tax base
  - Impact on property tax rate
  - Impact on sales and other taxes
  - Impact on fees, licenses, and other user charges
  - Impact on connection and stand-by charges
  - Impact on Federal and State grant subvention funding dependence and eligibility
  - Impact on interest earnings and cash revenues

B. Institutional

1. Impact on the provision of public services
  - Type, level, and displacement of public service (e.g., police, fire, sewerage, etc.)
2. Effect on public agencies
  - Impact on intergovernmental responsibility and coordination
3. Implementability
  - Public acceptability
  - Organizational and political feasibility
  - Legal capability
  - Impact on existing plans, regulations, and policies
  - Complexity or simplicity of control measures and their implementation
4. Flexibility
  - Reversability of decision

### III. ECONOMIC CRITERIA

#### A. Production of goods and services

1. Effect on industrial, commercial, agricultural, and service activity by categories (e.g., manufacturing, construction, transportation, etc.)
2. Effect on employment, unemployment, and underemployment
  - Impact on job creation and elimination by categories (e.g., professional, technical, crafts, etc.)

#### B. Income and investment

1. Effect on wages and salaries
2. Effect on rents
3. Effect on capital investment for new and replacement facilities or equipment
4. Effect on profits

#### C. Consumer expenditures

1. Effect on the prices of goods and services
2. Effect on consumption of goods and services

### IV. SOCIAL CRITERIA

#### A. Housing Supply

1. Effect on existing housing stock
  - Impact on the removal of housing by demolition or conversion
  - Impact on housing quality
  - Impact on the cost of housing and rent
  - Impact on the cost of housing rehabilitation & maintenance

2. Effect on new housing stock

- Impact on the cost of new housing
  - Cost of land
  - Cost of site preparation
  - Cost of construction
- Impact on supply of new housing
  - Quantity of new units produced
  - Proximity to employment opportunities

B. Physical Mobility

1. Impact on public transportation

- Cost
- Time
- Convenience
- Purpose of trip

2. Impact on private transportation

- Cost
- Time
- Convenience
- Purpose of trip

C. Health and Safety

1. Effect on site hazards

- Impact on seismic safety and risk
- Impact on flood plain safety and flood risk

2. Effect on transportation conflicts

3. Effect on public health

D. Sense of Community

1. Effect on community character
2. Effect on community stability

E. Equity

1. Impact on individual opportunity and lifestyle
2. Impact on special population groups
  - Aged
  - Youth
  - Ethnic Minorities
  - Women
  - Low-income
  - Handicapped people
  - Individuals with special employment problems

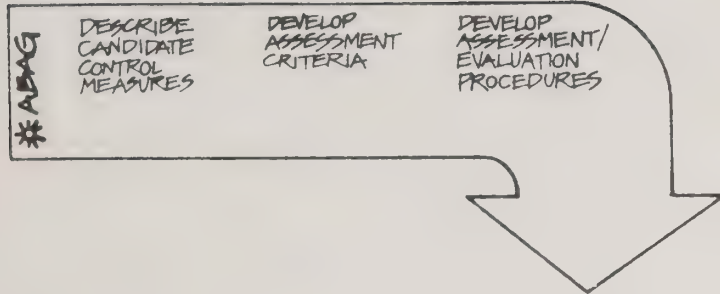
F. Urban Patterns

1. Location of development
2. Density of development
3. Type of development
4. Timing of development

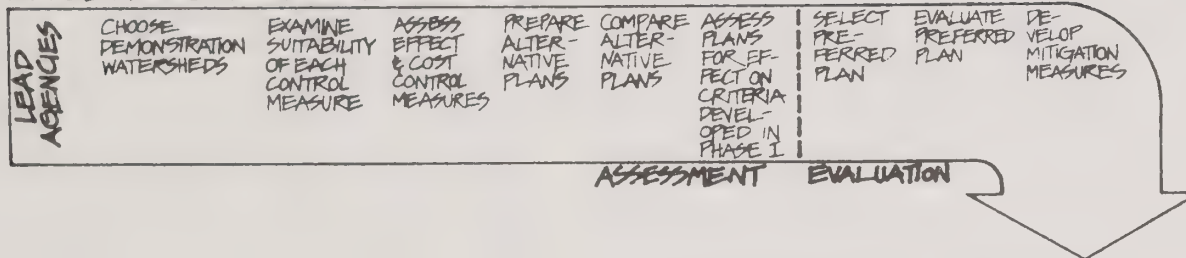


# SURFACE RUNOFF ASSESSMENT/EVALUATION FRAMEWORK

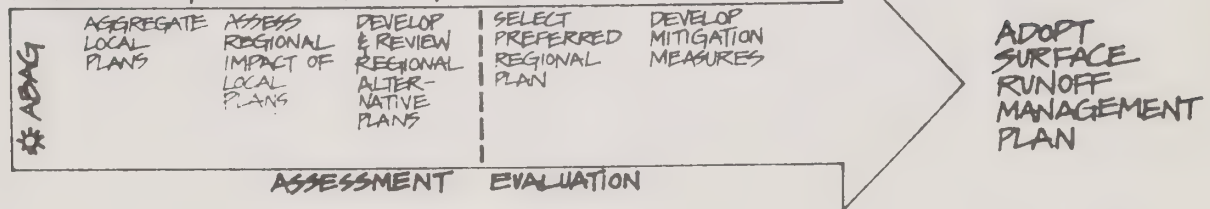
## PHASE I. DEVELOP PROCEDURES



## PHASE II. LOCAL ASSESSMENT/EVALUATION



## PHASE III. REGIONAL ASSESSMENT/EVALUATION



## 11.2.2 Agricultural Tilling

11.2.2.1 General – The two universal objectives of agricultural tilling are the creation of the desired soil structure to be used as the crop seedbed and the eradication of weeds. Plowing, the most common method of tillage, consists of some form of cutting loose, granulating, and inverting the soil and turning under the organic litter. Implements that loosen the soil and cut off the weeds but leave the surface trash in place, have recently become more popular for tilling in dryland farming areas.

During a tilling operation, dust particles from the loosening and pulverization of the soil are injected into the atmosphere as the soil is dropped to the surface. Dust emissions are greatest when the soil is dry and during final seedbed preparation.

11.2.2.2 Emissions and Correction Parameters – The quantity of dust emissions from agricultural tilling is proportional to the area of land tilled. In addition, emissions depend on the following correction parameters, which characterize the condition of a particular field being tilled: (1) surface soil texture, and (2) surface soil moisture content.

Dust emissions from agricultural tilling have been found to vary in direct proportion to the silt content (that is, particles between 2  $\mu\text{m}$  and 50  $\mu\text{m}$  in diameter—as defined by U.S. Department of Agriculture) of the surface soil (0-10 cm depth).<sup>1</sup> The soil silt content is commonly determined by the Buoyocous hydrometer method.<sup>2</sup>

Field measurements indicate that dust emissions from agricultural tilling are inversely proportional to the square of the surface soil moisture (0-10 cm depth).<sup>1</sup> Thornthwaite's precipitation-evaporation (PE) index<sup>3</sup> is a useful approximate measure of average surface soil moisture. The PE index is determined from total annual rainfall and mean annual temperature; rainfall amounts must be corrected for irrigation.

Available test data indicate no substantial dependence of emissions on the type of tillage implement when operating at a typical speed (for example, 8-10 km/hr).<sup>1</sup>

11.2.2.3 Corrected Emission Factor – The quantity of dust emissions from agricultural tilling, per acre of land tilled, may be estimated (within  $\pm 20$  percent) using the following empirical expression<sup>1</sup>:

$$E = \frac{1.4s}{\left(\frac{PE}{50}\right)^2} \quad (2)$$

where: E = Emission factor, pounds per acre

s = Silt content of surface soil, percent

PE = Thornthwaite's precipitation-evaporation index (Figure 11.2-2)

Equation 2, which was derived from field measurements, excludes dust that settles out within 20-30 ft (6-9 m) of the tillage path.

On the average, the dust emissions from agricultural tilling, as given by Equation 2, have the following particle size characteristics<sup>1</sup>:

approximate control efficiencies achievable for each method. Watering, because of the frequency of treatments required, is generally not feasible for public roads and is effectively used only where watering equipment is readily available and roads are confined to a single site, such as a construction location.

Table 11.2.1-1 CONTROL METHODS FOR UNPAVED ROADS

Control method	Approximate control efficiency, %
Paving	85
Treating surface with penetrating chemicals	50
Working soil stabilizing chemicals into roadbed	50
Speed control <sup>a</sup>	
30 mi/hr	25
20 mi/hr	65
15 mi/hr	80

<sup>a</sup>Based on the assumption that "uncontrolled" speed is typically 40 mi/hr. Between 30-50 mi/hr emissions are linearly proportional to vehicle speed. Below 30 mi/hr, however, emissions appear to be proportional to the square of the vehicle speed.<sup>1</sup>

#### References for Section 11.2.1

1. Cowherd, C., Jr., K. Axetell, Jr., C. M. Guenther, and G. A. Jutze. Development of Emission Factors for Fugitive Dust Sources, Midwest Research Institute, Kansas City, Mo. Prepared for Environmental Protection Agency, Research Triangle Park, N.C. under Contract No. 68-02-0619. Publication No. 450/3-74-037. June 1974.
2. Roberts, J. W., A. T. Rossano, P. T. Bosserman, G. C. Hofer, and H. A. Watters. The Measurement, Cost and Control of Traffic Dust and Gravel Roads in Seattle's Duwamish Valley. (Presented at Annual Meeting of Pacific Northwest International Section of Air Pollution Control Association, Eugene, November 1972. Paper No. AP-72-5.)
3. Sehmel, G. A. Particle Resuspension from an Asphalt Road Caused by Car and Truck Traffic. Atmos. Environ. 7: 291-309, July 1973.
4. Climatic Atlas of the United States. U. S. Department of Commerce, Environmental Sciences Services Administration, Environmental Data Service, Washington, D. C. June 1968.
5. Jutze, G. A., K. Axetell, Jr., and W. Parker. Investigation of Fugitive Dust Sources Emissions and Control. PEDCo Environmental Specialists, Inc., Cincinnati, Ohio. Prepared for Environmental Protection Agency, Research Triangle Park, N.C. under Contract No. 68-02-0044. Task No. 4. Publication No. EPA-450/3-74-036a. June 1974.

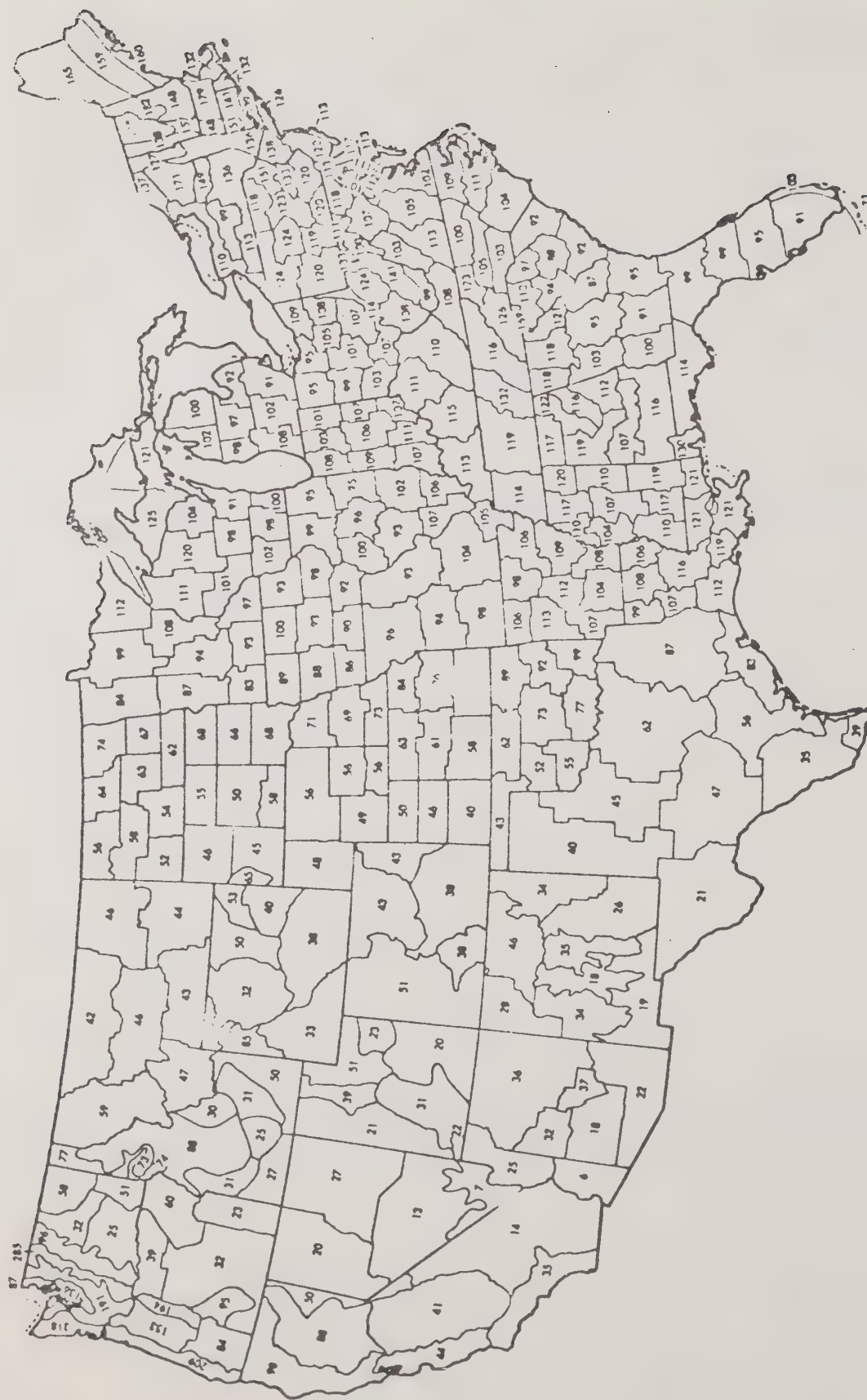


Figure 11.2.2. Map of Thornthwaite's Precipitation-Evaporation Index³ values for state climatic divisions.



## 11.2.4 Heavy Construction Operations

**11.2.4.1 General** – Heavy construction is a source of dust emissions that may have substantial temporary impact on local air quality. Building and road construction are the prevalent construction categories with the highest emissions potential. Emissions during the construction of a building or road are associated with land clearing, blasting, ground excavation, cut and fill operations, and the construction of the particular facility itself. Dust emissions vary substantially from day to day depending on the level of activity, the specific operations, and the prevailing weather. A large portion of the emissions result from equipment traffic over temporary roads at the construction site.

**11.2.4.2 Emissions and Correction Parameters** – The quantity of dust emissions from construction operations are proportional to the area of land being worked and the level of construction activity. Also, by analogy to the parameter dependence observed for other similar fugitive dust sources,<sup>1</sup> it is probable that emissions from heavy construction operations are directly proportional to the silt content of the soil (that is, particles smaller than 75  $\mu\text{m}$  in diameter) and inversely proportional to the square of the soil moisture, as represented by Thornthwaite's precipitation-evaporation (PE) index.<sup>2</sup>

**11.2.4.3 Emission Factor** – Based on field measurements of suspended dust emissions from apartment and shopping center construction projects, an approximate emission factor for construction operations is:

1.2 tons per acre of construction per month of activity

This value applies to construction operations with: (1) medium activity level, (2) moderate silt content ( $\sim 30$  percent), and (3) semiarid climate (PE  $\sim 50$ ; see Figure 11.2-2). Test data are not sufficient to derive the specific dependence of dust emissions on correction parameters.

The above emission factor applies to particles less than about 30  $\mu\text{m}$  in diameter, which is the effective cut-off size for the capture of construction dust by a standard high-volume filtration sampler<sup>1</sup>, based on a particle density of 2.0-2.5  $\text{g}/\text{cm}^3$ .

**11.2.4.4 Control Methods** – Watering is most often selected as a control method because water and necessary equipment are usually available at construction sites. The effectiveness of watering for control depends greatly on the frequency of application. An effective watering program (that is, twice daily watering with complete coverage) is estimated to reduce dust emissions by up to 50 percent.<sup>3</sup> Chemical stabilization is not effective in reducing the large portion of construction emissions caused by equipment traffic or active excavation and cut and fill operations. Chemical stabilizers are useful primarily for application on completed cuts and fills at the construction site. Wind erosion emissions from inactive portions of the construction site can be reduced by about 80 percent in this manner, but this represents a fairly minor reduction in total emissions compared with emissions occurring during a period of high activity.

### References for Section 11.2.4

1. Cowherd, C., Jr., K. Axetell, Jr., C. M. Guenther, and G. A. Jutze. Development of Emissions Factors for Fugitive Dust Sources. Midwest Research Institute, Kansas City, Mo. Prepared for Environmental Protection Agency, Research Triangle Park, N.C. under Contract No. 68-02-0619. Publication No. EPA-450/3-74-037. June 1974.
2. Thornthwaite, C. W. Climates of North America According to a New Classification. *Geograph. Rev.* 21: 633-655, 1931.
3. Jutze, G. A., K. Axetell, Jr., and W. Parker. Investigation of Fugitive Dust-Sources Emissions and Control, PEDCo Environmental Specialists, Inc., Cincinnati, Ohio. Prepared for Environmental Protection Agency, Research Triangle Park, N.C. under Contract No. 68-02-0044. Publication No. EPA-450/3-74-036a. June 1974.

TABLE 1MAJOR SOURCES OF COMMON AIR POLLUTANTS

<u>AIR POLLUTANT</u>	<u>SOURCES</u>
Sulfur Dioxide	Fuel combustion (coal, oil), sulfuric acid plants, metallurgical processes with sulfur-containing ores, oil refining, copper, lead and zinc smelters.
Ozone	Photo-chemical reaction of NO <sub>2</sub> and O <sub>2</sub> .
PAN (peroxyacetyl nitrate)	Photochemical reaction of NO <sub>2</sub> , hydrocarbons and ozone.
Smog	Complex photochemical reactions.
Fluorides	Reduction of phosphate fertilizers, ceramic, metal industries, electrolytic aluminum production, coal; foundry, cupola, blast furnace operations.
Nitrogen Oxides	High temperature combustion of fuels.
Hydrocarbons	Fuel combustion, incinerators, refineries, industrial drying of paints, enamels and printing ink.
Particles	Coal and oil burning power plants, iron/steel mills, cement mills, oil refineries, automobiles, incinerators.

TABLE 2

CROPS GROWN IN THE MTC STUDY AREA (10)  
AND THEIR SENSITIVITY TO VARIOUS AIR POLLUTANTS (1-7)

CROPS	COUNTY									POLLUTANT				
	Alameda	Contra Costa	Marietta	Napa	San Mateo	Santa Clara	Solano	Sonoma		Sulfur Dioxide	Ozone	PAN	Smog	Fluorides
Corn	0*	1	1	0	0	0	2	2		R**	S	R	R	S
Sorghum	0	2	0	0	0	1	3	0				R		I
Wheat	0	1	1	0	1	0	3	1		S	S	I	R	R
Oats	0	0	0	1	1	0	3	2		S	S	S	S	I
Barley	2	2	0	1	1	2	2	1		S	S	I	I	I
Rye	0	0	0	0	0	0	3	0		S	S		I	
Alfalfa	2	2	0	2	1	2	3	1		S	S	I	S	R
Clover, Timothy	2	1	0	1	1	1	1	2		S	S	I	I	R
Cotton	0	1	0	0	0	0	0	0		S		R		R
Green House	1	0	0	0	1	1	0	0		See Table 5				
Potatoes, Irish	0	0	0	0	1	0	0	0		R	S		I	I
Potatoes, Sweet	0	0	0	0	1	0	0	0		S	S		I	S
Berries	0	0	0	0	1	0	0	0					R	
Tomatoes	2	2	0	0	0	2	3	0		I	S	S	R	R
Cucumbers	1	0	0	0	0	2	1	0		R		R	R	
Snap Beans	1	0	0	0	0	1	1	0		S	S		R	R
Apples	0	0	0	0	1	1	0	2		I			R	I
Peaches	0	1	0	0	0	1	2	0		I			R	S
Pears	0	1	0	1	0	2	2	2		S				R
Cherries	1	1	0	0	0	2	1			R			R	I
Plums and Prunes	0	1	0	2	0	3	2	3		I			R	S
Grapes	1	1	0	2	1	2	1	3		I	S		S	S

- \* 0 less than 100 acres  
1 between 100 and 1,000 acres  
2 between 1,000 and 10,000 acres  
3 more than 10,000 acres

- \*\* R = resistant  
S = sensitive  
I = intermediate

TABLE 3

## THE SENSITIVITY OF ROW CROPS\* TO VARIOUS AIR POLLUTANTS

ROW CROP	POLLUTANT				
	Sulfur Dioxide	Ozone	PAN	Smog	Fluoride
Asparagus					R
Beet	S		I	S	
Broccoli	S		R	R	
Brussel Sprouts	S			R	
Cabbage	I			R	R
Cantaloupe	R			R	
Carrot	S		I	R	I
Cauliflower	I			R	
Celery	R			S	
Collards				R	
Egg Plant	I			I	
Endive	S			S	
Kale	I			R	
Leek	I			R	
Lettuce, Head	S		S	I	I
Lettuce, Romaine	S		S	S	I
Lima Bean			R		
Okra	S				
Onion	R	S	R	I	
Parsley	I			I	
Parship	I			I	
Pepper	S			R	
Peas	I				
Pinto Bean			S		
Pumpkin	S			R	
Radish	S	S	R	R	
Rhubarb	S			I	I
Spinach	S	S	I	S	I
Squash	S			R	R
Sugar Beet	I		I	I	R
Turnip	S			I	

\*Refs. 1-7

S = sensitive

R = resistant

I = intermediate



TABLE 4

SENSITIVITY OF TREES TO VARIOUS AIR POLLUTANTS

<u>TREES</u>	<u>POLLUTANT</u>				
	<u>Sulfur Dioxide</u>	<u>Ozone</u>	<u>PAN</u>	<u>Smog</u>	<u>Fluoride</u>
- Cypress					
- Sergeant					
Pigny					
Abram					
- Monterey					
Gowen					
Pines					
- Monterey					
Digger					
Knobcone					
- Bishop					
Yellow	S				S
Lodgepole	R				S
Ponderosa					
- New Needles	S				S
Old Needles	S				R
Oak					
- River					
Blue					
Black					
- Valley					
Scrub					
Douglas Fir	S	R	R		S
Incense Cedar					
- Redwood					
Laurel					
Eucalyptus				R	
- Tasmanian					
Bl. Gum					
Globulus					
- Alders		S			
Sycamore		S			R
Poplars	S				I
Cottonwood					
- Lithocarpus					
Tanoak					
Umbellularia					
- Chinguapin					
Rhodadendron					I
Nutmeg					
- Willow		S			R
Live Oak					

TABLE 5

SENSITIVITY OF FLOWERS TO VARIOUS AIR POLLUTANTS\*

<u>FLOWERS</u>	<u>POLLUTANTS</u>				
	<u>Sulfur Dioxide</u>	<u>Ozone</u>	<u>PAN</u>	<u>Smog</u>	<u>Fluoride</u>
Aster	S			I	I
Azalea			S		S
Bachelor's Button	S				
Begonia	I	S	R		
Chrysanthemum	R	S		I	
Cosmos	S				
Dahlia			S	R	S
Four O'clock	S				
Geranium		R			I
Gladiolus	R	R		R	S
Hibiscus	R				
Honeysuckle	R				
Iris	I				
Larkspur				S	
Lilac	R	S		I	
Marigold	I				
Nasturtium	I				
Pansy			R	R	
Peony				I	
Petunia		S	S	S	
Orchid				S	
Rose	R			S	I
Shasta Daisy				R	
Snapdragon				I	
Sweet Pea	S			I	
Sweet William	I				R
Tulip				S	
Violet				I	
Wisteria	R				
Zinnia	I			S	

\* Refs. 1-7

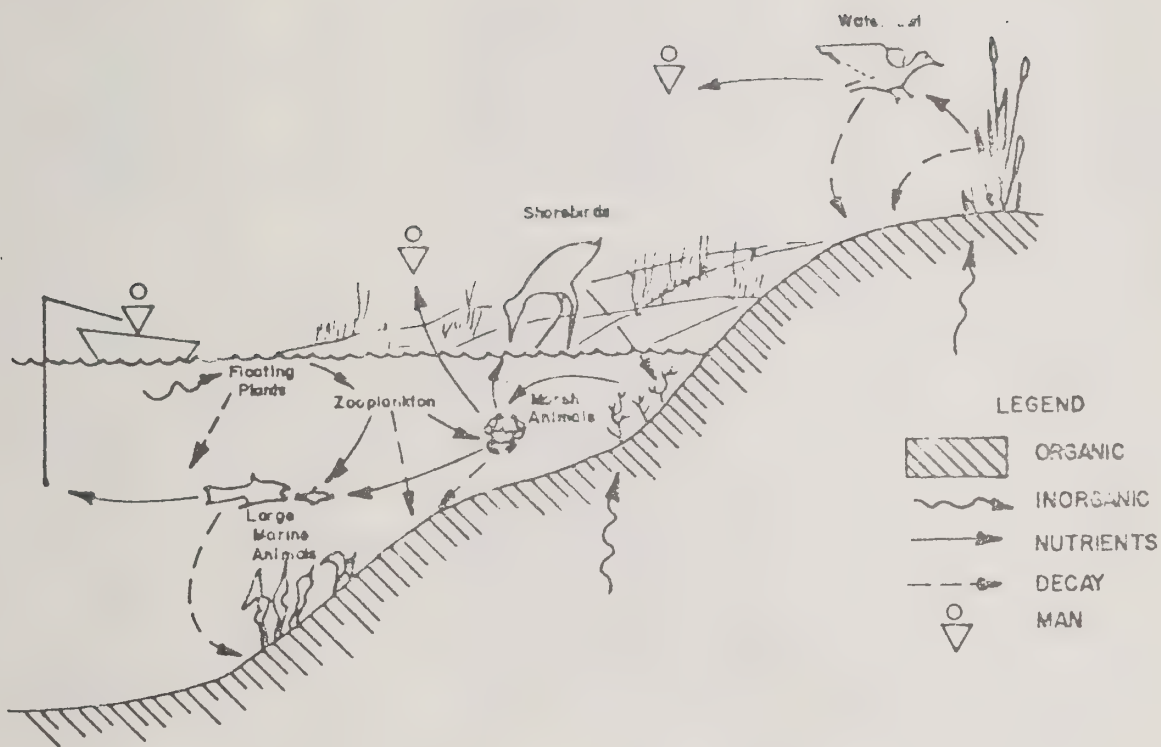


DIAGRAM RELATING ORGANISMS AND NATURAL PROCESSES IN THE ESTUARINE LIFE CYCLE

Table 6.\* SUMMARY OF POLLUTANTS, SOURCES, SYMPTOMS, VEGETATION AFFECTED, INJURY THRESHOLDS, AND CHEMICAL ANALYSES

Pollutants	Source	Symptom	Type of leaf affected	Part of leaf affected	Injury threshold <sup>a</sup>				Chemical analysis for pollutants in plants
					ppm	µg/m <sup>3</sup>	Sustained exposure	Reference	
Ozone (O <sub>3</sub> )	Photochemical reaction of hydrocarbon and nitrogen oxides from fuel combustion, refuse burning, and evaporation from petroleum products and organic solvents.	Fleck, stipple, bleaching bleached spotting, pigmentation, growth suppression, and early abscission. Tips of conifer needles become brown and necrotic.	Old, progressing to young	Palisade	0.03	70	4 hours	7	None
Peroxyacetyl nitrate (PAN)	Same sources as ozone	Glazing, silvery, or bronzing on lower surface leaves.	Young	Spongy cells	0.01	250	6 hours	13	None
Nitrogen dioxide (NO <sub>2</sub> )	High-temperature combustion of coal, oil, gas, and gasoline in power plants and internal combustion engines.	Irregular, white or brown collapsed lesion on intercostal tissue and near leaf margin.	Middle-aged	Mesophyll cells	2.5	4700	4 hours	15	None
Sulfur dioxide (SO <sub>2</sub> )	Coal, fuel oil, and petroleum.	Bleached spots, bleached areas between veins, bleached margin, chlorosis, growth suppression, early abscission, and reduction in yield.	Middle-aged	Mesophyll cells	0.3	800	8 hours	24	b
Hydrogen fluoride (HF)	Phosphate rock processing, aluminum industry, iron smelting, brick and ceramic works, and fiber-glass manufacturing.	Tip and margin burn, chlorosis, dwarfing, leaf abscission, and lower yield.	Mature	Epidermis and mesophyll	0.1 (ppb)	0.2	5 weeks	2	Distillation and titration
Chlorine (Cl <sub>2</sub> )	Leaks in chlorine storage tanks; hydrochloric acid mist.	Bleaching between veins, tip and margin burn, and leaf abscission.	Mature	Epidermis and mesophyll	0.10	300	2 hours	34	b
Ethylene (CH <sub>2</sub> )	Incomplete combustion of coal, gas, and oil for heating, and automobile and truck exhaust.	Sepal withering, leaf abnormalities; flower dropping, and failure of flower to open properly.	(Flower)	All	0.05	60	6 hours	35	None

<sup>a</sup>Metric equivalent based on 25°C and 760 mm mercury.<sup>b</sup>Chemical analysis often is not reliable for diagnosing chloride or sulfate accumulation in leaf tissue because undamaged plants often contain higher concentrations of these pollutants than are found in damaged plants.



**Table 11-6. List of Rare and Endangered Species  
for Basin-2\* and Adjacent Ocean Waters**

Common name	Scientific name	Source			
		FR	BSF&W	Cal. 1	Cal. 2
<b>Mammals</b>					
*Southern sea otter	<u>Enhydra lutris nereis</u>		T		
Elephant seal	<u>Mirounga angustirostris</u>		U		
Gray whale	<u>Eschrichtius glaucus</u>		T		
Humpback whale	<u>Megaptera novaeangliae</u>		T		
Salt marsh harvest mouse	<u>Reithrodontomys raviventris</u>	E	T	E	F
Sei whale	<u>Balaenoptera borealis</u>		T		
Blue whale	<u>Balaenoptera musculus</u>		T		
Finback whale	<u>Balaenoptera physalus</u>		T		
Right whale	<u>Eubalaena glacialis</u>		T		
Sperm whale	<u>Physeter catodon</u>		T		
<b>Birds</b>					
California brown pelican	<u>Pelecanus occidentalis</u>	E	T	E	
*Southern bald eagle	<u>Haliaeetus leucocoryphus</u>	E	T	E	F
White tailed kite	<u>Elanus leucurus</u>		T		F
American osprey	<u>Pandion haliaetus carolinensis</u>		U		
Prairie falcon	<u>Falco mexicanus</u>				
American peregrine falcon	<u>Falco peregrinus anatum</u>	E	T	E	F
*Greater sandhill crane	<u>Grus canadensis tabida</u>				F
California clapper rail	<u>Rallus longirostris obsoletus</u>	E	T	F	F
California black rail	<u>Laterallus jamaicensis coturniculus</u>		T	P	
Western snowy plover	<u>Charidus alexandrinus nivosus</u>		U		
Alaskan short billed dowitcher	<u>Limnodromus griseus caurinus</u>		U		
Yakutat fox sparrow	<u>Passerella iliaca annectens</u>		U		
California least tern	<u>Sterna albifrons browni</u>	E	T	E	F
California yellow-billed cuckoo	<u>Coccyzus americanus occidentalis</u>	E	T	E	F
Samuel's song sparrow	<u>Melospiza melodia samuelis</u>		U		
Suisun song sparrow	<u>Melospiza melodia maxillaris</u>		U		
San Francisco song sparrow	<u>Melospiza melodia pusillula</u>		U		
In addition, all shorebirds are protected.					
<b>Reptiles</b>					
Alameda striped racer	<u>Masticophis lateralis euryxanthus</u>			R	
San Francisco garter snake	<u>Thamnophis sirtalis tetrataenia</u>	E	T	E	F
Giant garter snake	<u>Thamnophis couchi gigas</u>		T	R	
<b>Fishes</b>					
Thicktail chub	<u>Gila crassicauda</u>		U	E	F
Sacramento perch	<u>Archoplites interruptus</u>		U		
Tidewater goby	<u>Eucyclogobius newberryi</u>		U		

FR - Federal Register, Vol. 35, Number 199, October 13, 1970.

BSF&W - Bureau of Sport Fisheries and Wildlife. Threatened Wildlife of the United States, 1973.

Cal. 1 - California Department of Fish and Game. At the Crossroads: A Report on California's Endangered and Rare Fish and Wildlife, 1974.

Cal. 2 - California Department of Fish and Game. California's Fully Protected Birds, Mammals, Reptiles, Amphibians and Fish, January, 1971.

T - Threatened

E - Endangered

R - Rare

F - Fully protected

U - Status uncertain

\* - Occurrence of this species or subspecies is uncertain or questionable.

\* San Francisco Bay Basin as delineated in the Water Quality Control Plan, State Water Resources Control Board and Regional Water Quality Control Board (roughly coterminous to EMP boundaries)

TABLE II-8

## RARE AND ENDANGERED PLANTS

Species	Habitat and Distribution	Status Codes				Comments
		(R)	(E)	(V)	(D)	
VERY RARE, RARE, AND ENDANGERED PLANTS						
<u>Amsinckia grandiflora</u> (Large-flowered fiddleneck)	Open grassy slopes below 1,200 feet. Inner coast range and adjacent valley; valley grassland, Contra Costa and Alameda Counties	3	3	2	3	Annual; blooms April-May... Extinct in Contra Costa County?
<u>Aster chilensis</u> var. <u>lentus</u> (Suisun aster)	Coastal salt marsh around Suisun Bay	3	2	7	3	Tall violet to white flowered perennial; blooms June-October
<u>Cicuta bolanderi</u> (Bolander water hemlock)	Salt marshes, Marin to Solano and Contra Costa Counties	2	2	2	3	White or greenish flowered perennial; blooms August-September
<u>Cirsium hydrophilum</u> var. <u>hydrophilum</u> (Suisun thistle)	Brackish marshes, Suisun Bay area	3	3	3	3	Fale flowered perennial; blooms July-September
<u>Cordylanthus mollis hispidus</u> (Hispid bird's beak)	Coastal salt marsh, Bay Area	2	2	2	3	Yellowish flowered annual; blooms June-July
<u>Cordylanthus mollis mollis</u> (Soft bird's beak)	Coastal salt marsh, Bay Area	PE	-	-	3	Yellowish flowered annual; blooms June-November. Presumed extinct
<u>Helianthella castanea</u> (Diablo helianthella)	Grassy hillsides, 500-4,000 feet. Valley grassland, foothill woodland, Bay Area	2	2	1	3	Yellow flowered perennial; blooms April-May
<u>Hesperolinon breweri</u> (Brewer dwarf flax)	Grassy or brushy slopes, 400-3,000 feet. Mostly partly shaded; partly on serpentine. Chaparral, foothill woodland. Inner coast ranges, Vaca Mountains to Mt. Diablo	2	1	1	3	Bright yellow flowered annual; blooms May-July
<u>Hibiscus californicus</u> (California hibiscus)	Moist banks, freshwater marsh, Lower Sacramento and San Joaquin Rivers	2	2	2	3	Shrub with white or pinkish flowers having a deep crimson center, blooms August-September
<u>Malocarpus macradenia</u> (Santa Cruz tarweed)	Heavy soils on grassy flats near the coast	3	2	2	3	Yellow flowered annual; blooms June-October
<u>Juglans hindsii</u> (Northern California black walnut)	Riparian areas and near old Indian campsites. Lake to Stanislaus Counties	2	2	2	3	Tree, usually one trunk, 15-19 leaflets; flowers April-May
<u>Lasthenia conjugens</u> (Contra Costa baeria)	Vernal pools, etc., up to 7,000 feet. Valley grassland	3	2	2	3	Yellow flowered annual; blooms April-May. Extinct in Contra Costa County?
<u>Lathyrus jepsonii jepsonii</u> (Delta tule pea)	Freshwater marsh, Suisun and San Pablo Bays	2	2	1	3	Perennial with crimson to rose-purple flowers; blooms May-June
<u>Leucopsis masonii</u> (an umbelliferae)	Marshes and brackish flats?	PE	-	-	3	Perennial. Presumed extinct

TABLE II-8  
(continued)

RARE AND ENDANGERED PLANTS

Species	Habitat and Distribution	Status Codes*				Comments
		(R)	(E)	(V)	(D)	
RARE BUT NOT ENDANGERED						
<u>Costaia colusana</u> (Colusa grass)	Vernal pools, Valley grassland	3	3	2	3	Annual grass; flowers May-July
<u>Orcuttia muhlenbergii</u> (Crampton's orcuttia)	Vernal pools, Valley grassland	3	3	2	3	Annual grass; flowers May-July
<u>Plagiobothrys hystericus</u> (Glabrous allocarya)	Plains and hills, Valley grassland. Solano County	2	1	1	3	White flowered annual; blooms April-May
<u>Trifolium arvense</u> (Showy Indian clover)	Low rich swales and fields, etc., Valley grassland	3	3	2	3	Annual, flowers purple, tipped with white; blooms April-June
<u>Tropidocarpum caparideum</u> (Caper-fruited tropidocarpum)	Alkaline low hills below 500 feet; Valley grassland near base of Mt. Diablo	2	1	1	3	Yellow flowered annual; blooms March-April
<u>Grindelia humilis</u> (a gum plant)	Coastal salt marsh, San Francisco, San Pablo and Suisun Bays	1	?	?	?	Yellow flowered perennial; blooms August-October
PLANTS OF LIMITED DISTRIBUTION BUT NOT RARE						
<u>Lalsam: P. macrolepis</u> <u>macrolepis</u> (a balsamroot)	Fields and rocky hillsides to 2,000 feet. Valley grassland and foothill woodland. Interior slopes near San Francisco Bay	0	?	?	?	Yellow flowered perennial; blooms March-June

Sources: California Native Plant Society, 1974  
Munz and Keck, 1959  
Munz, 1968

Definition of Status Codes:

Rarity (R)

1. Rare, of limited distribution, but distributed widely enough that potential for extinction or extirpation is apparently low at present.
2. Occurrence confined to several populations or one extended population.
3. Occurs in such small numbers that it is seldom reported; or occurs in one or very few highly restricted populations.

PE Possibly extinct or extirpated.

Endangerment (E)

1. Not endangered.
2. Endangered in part.
3. Totally endangered.

Vigor or Population Trend (V)

1. Stable or increasing.
2. Declining.
3. Approaching extinction or extirpation.

General Distribution (D)

1. Not rare outside California.
2. Rare outside California.
3. Endemic to California.



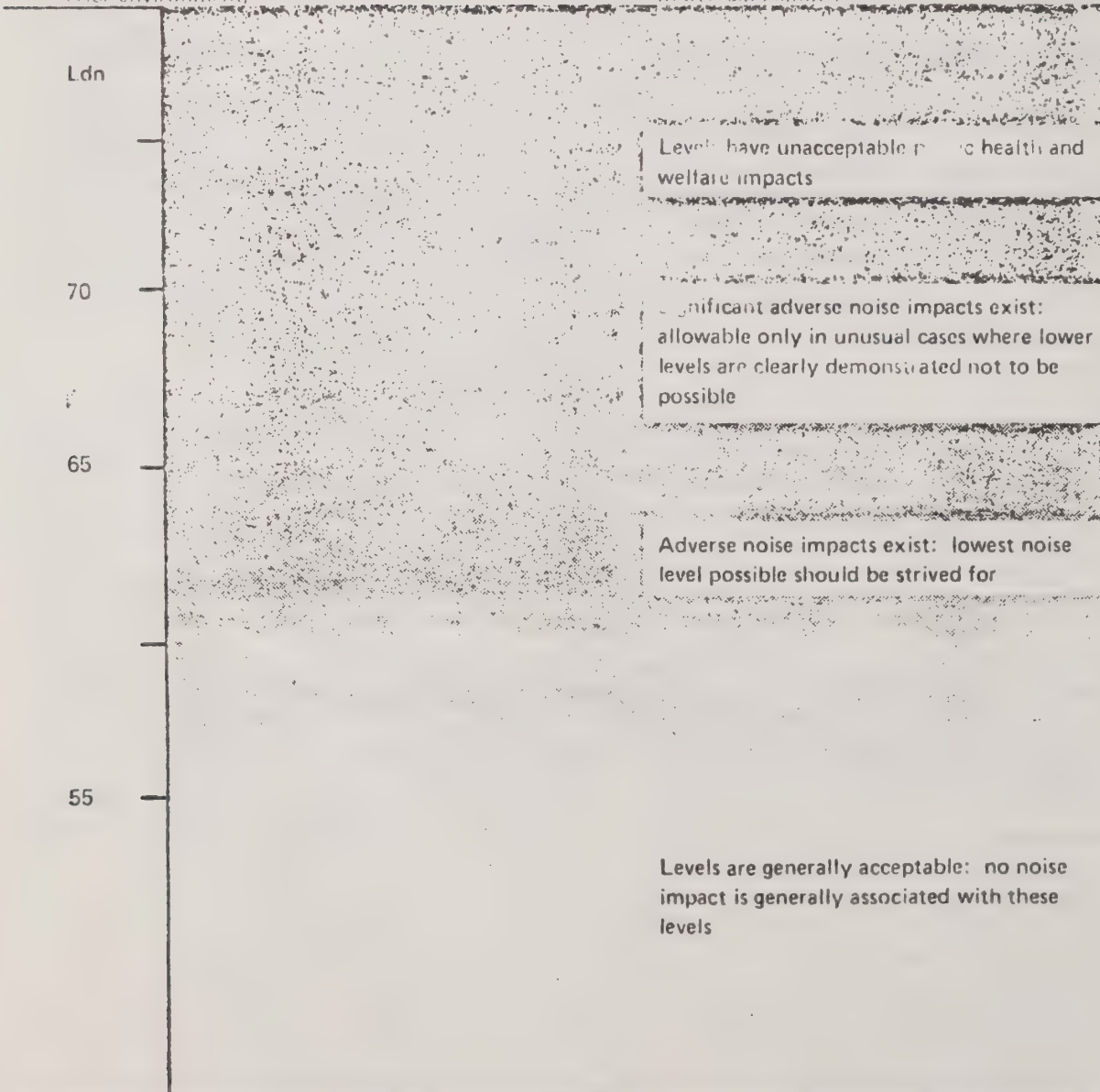
COURTESY OF  
UNITED STATES  
ENVIRONMENTAL  
PROTECTION AGENCY  
REGION IX

SAN FRANCISCO, CA 94111

For Residential, Hospital and Educational  
Activity

Environmental Noise Level\*  
Associated with an Action  
(Exterior environment)

Qualitative Considerations Applicable to  
Individual Actions







\*Some structures do not contain relevant exterior activity space and therefore, in these case, special determination of the acceptability of the interior environment should be made.



Figure 2

LAND USE COMPATABILITY FOR COMMUNITY NOISE ENVIRONMENTS

LAND USE CATEGORY	COMMUNITY NOISE EXPOSURE L <sub>dn</sub> OR CNEL, dB						INTERPRETATION
	55	60	65	70	75	80	
RESIDENTIAL - LOW DENSITY SINGLE FAMILY, DUPLEX, MOBILE HOMES							 <b>NORMALLY ACCEPTABLE</b> Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
RESIDENTIAL - MULTI. FAMILY							
TRANSIENT LODGING - MOTELS, HOTELS							 <b>CONDITIONALLY ACCEPTABLE</b> New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.
SCHOOLS, LIBRARIES, CHURCHES, HOSPITALS, NURSING HOMES							
AUDITORIUMS, CONCERT HALLS, AMPHITHEATRES							 <b>NORMALLY UNACCEPTABLE</b> New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
SPORTS ARENA, OUTDOOR SPECTATOR SPORTS							
PLAYGROUNDS, NEIGHBORHOOD PARKS							 <b>CLEARLY UNACCEPTABLE</b> New construction or development should generally not be undertaken.
GOLF COURSES, RIDING STABLES, WATER RECREATION, CEMETERIES							
OFFICE BUILDINGS, BUSINESS COMMERCIAL AND PROFESSIONAL							
INDUSTRIAL, MANUFACTURING UTILITIES, AGRICULTURE							

CONSIDERATIONS IN DETERMINATION OF NOISE-COMPATIBLE LAND USE

A. NORMALIZED NOISE EXPOSURE INFORMATION DESIRED

Where sufficient data exists, evaluate land use suitability with respect to a "normalized" value of CNEL or L<sub>dn</sub>. Normalized values are obtained by adding or subtracting the constants described in Table 1 to the measured or calculated value of CNEL or L<sub>dn</sub>.

B. NOISE SOURCE CHARACTERISTICS

The land use-noise compatibility recommendations should be viewed in relation to the specific source of the noise. For example, aircraft and railroad noise is normally made up of higher single noise events than auto traffic but occurs less frequently. Therefore, different sources yielding the same composite noise exposure do not necessarily create the same noise environment. The State Aeronautics Act uses 65 dB CNEL as the criterion which airports must eventually meet to protect existing residential communities from unacceptable exposure to aircraft noise. In order to facilitate the purposes of the Act, one of which is to encourage land uses compatible with the 65 dB CNEL criterion wherever possible, and in order to facilitate the ability of airports to comply with the Act, residential uses located in Com-

munity Noise Exposure Areas greater than 65 dB should be discouraged and considered located within normally unacceptable areas.

C. SUITABLE INTERIOR ENVIRONMENTS

One objective of locating residential units relative to a known noise source is to maintain a suitable interior noise environment at no greater than 45 dB CNEL of L<sub>dn</sub>. This requirement, coupled with the measured or calculated noise reduction performance of the type of structure under consideration, should govern the minimum acceptable distance to a noise source.

D. ACCEPTABLE OUTDOOR ENVIRONMENTS

Another consideration, which in some communities is an overriding factor, is the desire for an acceptable outdoor noise environment. When this is the case, more restrictive standards for land use compatibility, typically below the maximum considered "normally acceptable" for that land use category, may be appropriate.

Assessment/Evaluation Technical Memorandum 1 is included in the Surface Runoff Assessment **Procedures** Manual Appendix immediately preceding this series of technical materials.

ASSESSMENT / EVALUATION  
COST ASSESSMENT  
TECHNICAL MEMORANDUM No. 2  
AUGUST 3, 1977

Introduction

The Environmental Management Program is composed of seven separate management plans, each of which is comprised of policy statements and control measures or recommendations directed toward improving environmental quality. Most measures and policy statements will have costs associated with their implementation. This memorandum sets forth guidelines and conventions for performing the Cost Assessment of the Environmental Management Program Assessment Checklist introduced in Technical Memorandum #1. Use of consistent methods as outlined here insures the comparability of information across all management plans.

The definitions and rules specified here apply to estimating both the DIRECT PUBLIC and DIRECT PRIVATE MONETARY COSTS of implementation of control measures and recommendations. Broader economic and social impacts will not be dealt with here, but are considered as part of the overall impact assessment.

A. Categories of Direct Costs

Direct public and private costs are divided into three basic cost categories as follows:

1. Capital Costs:

Capital costs include the cost of land, structures, equipment, equipment replacement, relocation, right-of-way and easement acquisition; research and design engineering; field exploration, and engineering services during construction; contractor's costs including overhead and profit; planning, administrative, and legal services involved in capital investment; and startup costs such as operator training.

2. Operation and Maintenance Costs:

This cost category subsumes costs of energy, labor, parts, materials, overhead, chemicals, and repair of equipment and structures necessary to operate and maintain the capital investment.



### 3. Administrative and Regulatory Costs:

The administrative and regulatory cost category includes planning, public participation, coordination with other agencies or firms, and additional program management costs; monitoring and data evaluation costs; enforcement and licensing costs.

#### B. Measurement Conventions

Cost estimates should be given in constant dollar values. January 1, 1977 will be the base date for cost estimates. Where 1977 data are not available, the most current estimates of costs may be used and adjusted to reflect 1977 prices using the appropriate price index. Therefore, future costs will not include speculation about changes in prices and wages due to inflation.

The two indices selected for price adjustment are the Engineering News Record Construction Cost Index (ENRCC) and the Consumer Price Index (CPI). The ENRCC should be used when adjusting capital and operation and maintenance costs. The CPI should be used when adjusting administrative and regulatory costs. The values to be used for each index for January 1, 1977 are:

1. ENRCC (San Francisco) = 3100
2. CPI (San Francisco-Oakland) = 170

See Appendix A for further information on price adjustment methods and indices.

#### C. Discount Rate

Discounting is a way to account for the opportunity cost of funds committed to a program or project, in that the funds could also have been gainfully employed in the private sector of the economy or in some other public project. By discounting future costs by a discount (or interest) rate reflecting the opportunity cost of the investment, future cost streams can be measured at some initial starting date and added to startup costs to render a total project cost adjusted for earnings foregone.

Total cost estimates should be discounted to present value (PDV) using the  $6\frac{3}{8}\%$  rate prescribed by the Water Resources Council. In addition to this rate, reflective of the federal bond interest rate, a 10% rate reflecting private sector interest rates will be used in present discounted value calculations for purposes of determining the sensitivity of a proposal to alternative rates. ABAG has developed a computer program for discounting cost estimates. This program is available to any counties or agencies participating in the Environmental Management Program.

#### D. Analysis Period and Allowance for Growth

Short-term and long-term periods of analysis are to be used in the cost assessment. Both periods begin in 1978, assuming plan adoption in that year. Detailed cost data should be developed for the short-term, 1978-83, to aid in preparation of the required five-year financial budgets. Estimates should also be given for the long-term period, 1983-2000. Although development of accurate long-term costs poses a difficult problem in estimation, for general comparative purposes, an extrapolation of short-term costs is sufficient for preparing long-term figures.



In the development of both short and long-term costs, wherever estimates of future costs are a function of projected growth in population, employment, housing, or land use, the Series 3 Base Case 1 projections developed by ABAG should be used for adjustment of cost estimates.

#### E. Program Revenues

Some control measures may generate revenues, such as fines, fees, and user-charges. It should be noted that although these revenues can be expected to defray some program costs, they will not be treated here, but rather should be reported under the Institutional/Financial and/or Economic Impacts categories of the Assessment Summary Table. See Surface Runoff Management Plan, Technical Memorandum No. 8, July 27, 1977, pages 11, 12, & 13.

#### F. Sunk Costs and Salvage Value

Sunk costs and salvage values refer, respectively, to capital assets in existence at the beginning and end of a program or project. Investments or cost commitments made prior to or during the current environmental management planning period should be regarded as sunk costs. Sunk costs should NOT be included in cost estimates.

Salvage value of capital investments such as land, structures, and equipment, should be treated as program assets. The following assumptions should be used to determine salvage values:

##### 1. Land:

At the end of the planning period, land for treatment works (including land for process or ultimate disposal or residues) should be assumed to have a salvage value equal to its current market value less any costs necessary to restore the land to pre-project conditions. Land reclaimed by land treatment of sludge disposal will assume a salvage value of the value of the reclaimed land. Rights-of-way and easements will assume a salvage value not greater than the current market value of those rights-of-way or easements.

##### 2. Permanent Structures and Equipment:

If the structures or equipment can be expected to continue fulfilling their planned use(s), they would have a salvage value at the end of the planning period. The salvage value would be based on the remaining economic life using straight line depreciation over the assumed economic life.<sup>1</sup>

##### 3. Economic Lives: The following general guidelines should be used for estimating economic lives:

Land-Permanent

Structures- 30 to 50 years

Equipment- 15 to 30 years

More detailed useful life assumptions may be necessary to accommodate the mixed elements often involved in control measures. This information should be developed as needed.

---

<sup>1</sup>Straight-line depreciation is performed by depreciating the initial cost in equal increments equal to the cost divided by the economic life of the capital investment. The computer program which calculates present discounted value automatically computes depreciation.

#### H. Cost Estimate Worksheet

A worksheet (see page 5) has been designed to facilitate preparation of the cost estimates, including the present discounted value calculation. The worksheet format has been generalized to accomodate the different categories of costs described earlier. The entire worksheet will not always be completed, but only those cost categories specific to the control measure. Also, a separate sheet should be filled out for public and private costs. If more space is needed, additional worksheets can be attached. The worksheet has been designed so that it can be copied and used directly. A cost example, including the preparation of this form is presented in the next section.

# DIRECT COSTS OF ENVIRONMENTAL CONTROLS\*

CONTROL MEASURE: \_\_\_\_\_

JURISDICTION or AGENCY: \_\_\_\_\_

PUBLIC or PRIVATE COST (circle one)

Costs: All costs must be reported in constant 1977 dollar values.

Years: The year that capital items are first purchased (e.g. land, improvements, and equipment) should be reported in that calendar year (e.g., 1978).

Life: The economic life of equipment or improvements should be reported in numbers of years.

Replacement Cost: The replacement cost of capital items (improvements and equipment) are computed automatically in the program and should not be reported separately.

Operation/Maintenance and Administration/Regulatory Costs: These costs should be specified as total costs. They are assumed to apply until replaced by another cost specification in another year.

LAND: COST: \_\_\_\_\_  
 YEAR: \_\_\_\_\_  
 RECLAMATION COST: \_\_\_\_\_

IMPROVEMENT #1	EQUIPMENT #1	OPERATION/MAINTENANCE #1	ADMINISTRATION/REGULATORY #1
COST: _____	COST: _____	COST: _____	COST: _____
YEAR: _____	YEAR: _____	YEAR: _____	YEAR: _____
LIFE: _____	LIFE: _____		
IMPROVEMENT #2	EQUIPMENT #2	OPERATION/MAINTENANCE #2	ADMINISTRATION/REGULATORY #2
COST: _____	COST: _____	COST: _____	COST: _____
YEAR: _____	YEAR: _____	YEAR: _____	YEAR: _____
LIFE: _____	LIFE: _____		
IMPROVEMENT #3	EQUIPMENT #3	OPERATION/MAINTENANCE #3	ADMINISTRATION/REGULATORY #3
COST: _____	COST: _____	COST: _____	COST: _____
YEAR: _____	YEAR: _____	YEAR: _____	YEAR: _____
LIFE: _____	LIFE: _____		
IMPROVEMENT #4	EQUIPMENT #4	OPERATION/MAINTENANCE #4	ADMINISTRATION/REGULATORY #4
COST: _____	COST: _____	COST: _____	COST: _____
YEAR: _____	YEAR: _____	YEAR: _____	YEAR: _____
LIFE: _____	LIFE: _____		
IMPROVEMENT #5	EQUIPMENT #5	OPERATION/MAINTENANCE #5	ADMINISTRATION/REGULATORY #5
COST: _____	COST: _____	COST: _____	COST: _____
YEAR: _____	YEAR: _____	YEAR: _____	YEAR: _____
LIFE: _____	LIFE: _____		

\*Report Public & Private Costs on Separate forms.

## 1. Development of Cost Estimates

Eight basic steps should be followed in developing cost estimates of control measures. These steps are listed below, along with an example of each step.

### 1. State the problem.

PROBLEM: Significant amounts of litter accumulate at bus stops, and on sidewalks in the central business district in a hypothetical city.

### 2. Specify Control Measure(s) to be applied to solve problem.

CONTROL MEASURE: Increase Number of Litter Receptacles In Strategic Locations - Recommend that the city install trash containers at bus stops, and in business district.

### 3. State All Assumptions about the Control Measure.

ASSUMPTIONS: A. All costs accrue to public sector.

B. Assume city has 5 miles of Business District sidewalk. Each block averages 1500 ft. which results in approximately 18 blocks.

C. Assume 1 container at each corner and one every 100 ft. within each block.

D.  $16 \text{ containers per block} \times 18 \text{ blocks} = 288 \text{ containers.}$

E. Assume bus route has 150 stops.

F. Assume 1 container at each stop.  $1 \times 150 = 150$  containers.

G. Total containers = 438.

H. Assume 20% of the containers will have to be replaced annually (vandalism, accidents, etc.)  
 $.20 \times 438 = 87.6$  containers replaced per year.

I. Assume maintenance personnel will spend 1.5 hours per container per year.  $1.5 \times 438 = 657$  hours.

J. Assume program expands by 15 percent in 1990 due to growth in commercial area based on Series 3 Base Case 1 projections, 1975-1990.



4. State all assumptions and sources of cost data used.

A. Capital Costs

- i) Called trash container manufacturer for estimates of container cost:

Waste containers vary in cost from \$35.00 for pole-mounted wire baskets (8" X 18" X 24") to \$280.00 for concrete containers with exposed aggregate finish and removable inner containers.

- ii) Assume median cost of \$125.00  
iii) Costs in 1977 dollars.

B. Operation and Maintenance Costs

- i) Called a sample of county and city departments to establish an average maintenance personnel wage rate:

Average Wage Rate (1976 Dollars)<sup>2</sup> = \$12.40/hour

- ii) Adjust Wage Rate To 1977 Dollars Using  
ENRCC (see Appendix A for methods of cost adjustment)-  
ENRCC (1977) = 3100  
ENRCC (1976) = 2824

Average Wage Rate (1977 Dollars)<sup>2</sup> =  $\frac{3100}{2824} \times \$12.40 = \$13.62/\text{hour}$

- iii) Contract with scavenger company to collect trash once a week is \$72.00 per container per year.  
iv) Scavenger Company Rate in 1977 dollars

C. Administration and Regulatory Costs

- i) Average Wage Rate For Administrative  
Personnel From a Sample of Agencies<sup>2</sup> = \$16.06/hour

- ii) Wage rate in 1976 dollars

- iii) Adjust to 1977 dollars using CPI (remember that the CPI is used to adjust Administrative and Regulatory Costs while the ENRCC is used for Capital and Operation and Maintenance Costs)- CPI (1977) = 170  
CPI (1976) = 168

Average Wage Rate (1977 Dollars)<sup>2</sup> =  $\frac{170}{168} \times \$16.06 = \$16.25/\text{hour}$

---

<sup>2</sup>Average wage rate includes salaries, benefits, and overhead. Overhead rate of 45 percent assumed which includes rent, supplies, equipment, furniture, general support staff, and local travel.

5. Perform cost estimate calculations.

A. Capital Costs

i) 1978-1989:

Median container cost = \$125.00

Number of containers = 438

Capital Cost = \$125.00 X 438 X \$54,750.00

ii) 1990-2000:

Number of containers increases by 15 percent due to growth  
of commercial areas = (438) (1.15) = 504

Capital Cost = \$125.00 X 504 = \$63,000.00

Additional Capital Cost Starting in 1990 = \$8,250.00

B. Operation and Maintenance Costs

i) 1978-1989:

Twenty percent of the containers will have to be replaced  
annually = 87.6 containers.

Replacement Cost = 87.6 X \$125.00 = \$10,950.00

Average Maintenance Personnel Wage Rate = \$13.62/hour

Estimated maintenance hours = 657.0

Maintenance Personnel Costs = 657.0 X \$13.62 = \$8,948.00

Scavenger Company contract = \$72.00 per container per year

Collection Cost = \$72.00 X 438 = \$31,536.00

O & M Costs = \$51,434.00/YEAR

ii) 1990-2000:

O & M Costs Increase by 15 percent due to growth

O & M Costs = 1.15 X \$51,434.00 = \$59,149.00/YEAR

C. Administration and Regulatory Costs

i) 1978-1989:

Administrator to spend 4 hours per month to oversee program  
operation = 48 hours/year

Average administrator cost = \$16.25/hour

Administration Cost = \$16.25 X 48 = \$780.00/YEAR

ii) 1990-2000:

A & R Costs Increase By 15 percent due to growth

A & R Costs = 1.15 X \$780.00 = \$897.00/YEAR

6. Report costs on Cost Estimate Worksheet.

Report direct public and direct private costs on separate worksheets. A sample sheet is shown on the next page for the current example.

7. Convert all costs to Present Discounted Value.

Detailed procedures for making this calculation are explained in such books as Principles of Engineering Economy by Eugene L. Grant and W. Grant Ireson, 5th Edition, New York: Ronald Press, 1970; and Economics of Water Resource Planning by L. Douglas James and Robert Lee, New York, McGraw-Hill, 1971. ABAG has a program to perform this calculation for any counties or agencies participating in the Environmental Management Program (the necessary cost information should be provided on the cost estimate worksheet). For the current example, (see Tables 1 & 2 for details):

Present Discounted Value (6 $\frac{3}{8}$ %) = 786016

Present Discounted Value (10%) = 592351

8. Report all direct public and private costs on the Impact Assessment Summary Sheet.

The Impact Assessment Summary Sheet is described on pages 11, 12, and 13 of Surface Runoff Management Plan, Technical Memorandum No. 8, July 27, 1977, Guidance For Preparation of the Document Describing County Surface Runoff Plan.

# COST ESTIMATE WORKSHEET

## DIRECT COSTS OF ENVIRONMENTAL CONTROLS\*

CONTROL MEASURE: INCREASE NUMBER OF LITTER RECEPTACLES IN STRATEGIC LOCATIONS

JURISDICTION or AGENCY: HYPOTHETICAL CITY

PUBLIC or PRIVATE COST (circle one)

Costs: All costs must be reported in constant 1977 dollar values.

Years: The year that capital items are first purchased (e.g. land, improvements, and equipment) should be reported in that calendar year (e.g., 1978).

Life: The economic life of equipment or improvements should be reported in numbers of years.

Replacement Cost: The replacement cost of capital items (improvements and equipment) are computed automatically in the program and should not be reported separately.

Operation/Maintenance and Administration/Regulatory Costs: These costs should be specified as total costs. They are assumed to apply until replaced by another cost specification in another year.

EXAMPLE

LAND: COST: \_\_\_\_\_  
YEAR: \_\_\_\_\_  
RECLAMATION COST: \_\_\_\_\_

IMPROVEMENT #1	EQUIPMENT #1	OPERATION/MAINTENANCE #1	ADMINISTRATION/REGULATORY #1
----------------	--------------	--------------------------	------------------------------

COST: _____	COST: <u>\$54750.00</u>	COST: <u>\$51434.00</u>	COST: <u>\$780.00</u>
YEAR: _____	YEAR: <u>1978</u>	YEAR: <u>1978</u>	YEAR: <u>1978</u>
LIFE: _____	LIFE: <u>5</u>		

IMPROVEMENT #2	EQUIPMENT #2	OPERATION/MAINTENANCE #2	ADMINISTRATION/REGULATORY #2
----------------	--------------	--------------------------	------------------------------

COST: _____	COST: <u>\$8250.00</u>	COST: <u>\$59149.00</u>	COST: <u>\$897.00</u>
YEAR: _____	YEAR: <u>1990</u>	YEAR: <u>1990</u>	YEAR: <u>1990</u>
LIFE: _____	LIFE: <u>5</u>		

IMPROVEMENT #3	EQUIPMENT #3	OPERATION/MAINTENANCE #3	ADMINISTRATION/REGULATORY #3
----------------	--------------	--------------------------	------------------------------

COST: _____	COST: _____	COST: _____	COST: _____
YEAR: _____	YEAR: _____	YEAR: _____	YEAR: _____
LIFE: _____	LIFE: _____		

IMPROVEMENT #4	EQUIPMENT #4	OPERATION/MAINTENANCE #4	ADMINISTRATION/REGULATORY #4
----------------	--------------	--------------------------	------------------------------

COST: _____	COST: _____	COST: _____	COST: _____
YEAR: _____	YEAR: _____	YEAR: _____	YEAR: _____
LIFE: _____	LIFE: _____		

IMPROVEMENT #5	EQUIPMENT #5	OPERATION/MAINTENANCE #5	ADMINISTRATION/REGULATORY #5
----------------	--------------	--------------------------	------------------------------

COST: _____	COST: _____	COST: _____	COST: _____
YEAR: _____	YEAR: _____	YEAR: _____	YEAR: _____
LIFE: _____	LIFE: _____		

\*Report Public & Private Costs on Separate forms.



T A B L E I

PUBLIC COST OF INCREASING THE NUMBER OF LITTER  
RECEPTACLES FOR A HYPOTHETICAL CITY

## PROJECT COST ESTIMATES

YEAR	TOTAL COST	LAND COST	IMPROVEMENT COSTS	EQUIPMENT COSTS	OPERATING & MAINTENANCE COSTS	ADMINISTRATIVE COSTS	PRESENT VALUE COSTS ----- (R = 6 3/8%) (R = 10%)	
1978	106964.	0.	0.	54750.	51434.	780.	100554.	97240.
1979	52214.	0.	0.	0.	51434.	780.	46143.	43152.
1980	52214.	0.	0.	0.	51434.	780.	43378.	39229.
1981	52214.	0.	0.	0.	51434.	780.	40778.	35663.
1982	52214.	0.	0.	0.	51434.	780.	38334.	32421.
1983	106964.	0.	0.	54750.	51434.	780.	73824.	60378.
1984	52214.	0.	0.	0.	51434.	780.	33877.	26794.
1985	52214.	0.	0.	0.	51434.	780.	31847.	24358.
1986	52214.	0.	0.	0.	51434.	780.	29939.	22144.
1987	52214.	0.	0.	0.	51434.	780.	28144.	20131.
1988	106964.	0.	0.	54750.	51434.	780.	54200.	37490.
1989	52214.	0.	0.	0.	51434.	780.	24872.	16637.
1990	68296.	0.	0.	8250.	59149.	897.	30583.	19763.
1991	60046.	0.	0.	0.	59149.	897.	25277.	15812.
1992	60046.	0.	0.	0.	59149.	897.	23762.	14375.
1993	114796.	0.	0.	54750.	59149.	897.	42707.	24983.
1994	60046.	0.	0.	0.	59149.	897.	21000.	11880.
1995	68296.	0.	0.	8250.	59149.	897.	22453.	12284.
1996	60046.	0.	0.	0.	59149.	897.	18558.	9818.
1997	60046.	0.	0.	0.	59149.	897.	17446.	8925.
1998	114796.	0.	0.	54750.	59149.	897.	31354.	15513.
1999	27196.	0.	0.	0.	59149.	897.	6983.	3341.

PRESENT DISCOUNTED VALUE(1977) = 786016. 592351.

T A B L E II

PUBLIC COST OF INCREASING THE NUMBER OF LITTER  
RECEPTACLES FOR A HYPOTHETICAL CITY

## CAPITAL COST COMPONENTS SUMMARY

COMPONENT	INITIAL COST (\$)	YEAR STARTED	LIFE (YRS)	USEFUL LIFE VALUE (\$)
EQUIPMENT	63000.			
EQUIPMENT 1	54750.	1978	5	32850.
EQUIPMENT 2	8250.	1990	5	0.
TOTAL ASSET VALUE 2000 =				32850.

## APPENDIX A

### Cost Indices For Adjusting To 1977 Constant Dollars

In order to make costs comparable across all of the Environmental Management Plans, all cost estimates will be expressed in 1977 constant dollars. This means that all historic costs will be adjusted to January 1, 1977 constant dollars by the appropriate price index. A price index represents the change in cost over time of a fixed pattern of consumption assuming that changes in quality or relative prices have been constant. Future costs will be expressed in 1977 constant dollars. Therefore, future costs will not include speculation about price level changes, although an alternative estimate may be made, including estimated price level changes.

The two indices selected are the Engineering News Record Construction Cost Index (ENRCC) and the Consumer Price Index (CPI). The ENRCC should be used when adjusting capital and operation and maintenance costs. The CPI should be used when adjusting administrative and regulatory costs. The values to be used for each index for January 1, 1977 are:<sup>1</sup>

1) ENRCC (San Francisco) = 3100 (Based on 1913 average = 100)

2) CPI (San Francisco-Oakland) = 170 (Based on 1967 average = 100)

The following relationships illustrate how to make the cost adjustments:

$$\begin{array}{l} \text{Capital} \\ \text{Cost Estimate} \\ \text{(1977)} \end{array} = \frac{3100}{\text{ENRCC Index of year} \\ \text{that cost estimate} \\ \text{is available}} \times \text{Capital Costs}$$

$$\begin{array}{l} \text{Operation and} \\ \text{Maintenance Cost} \\ \text{Estimate} \\ \text{(1977)} \end{array} = \frac{3100}{\text{ENRCC Index of year} \\ \text{that cost estimate} \\ \text{is available}} \times \text{Operation and} \\ \text{Maintenance Costs}$$

$$\begin{array}{l} \text{Administrative and} \\ \text{Regulatory Cost} \\ \text{Estimate} \\ \text{(1977)} \end{array} = \frac{170}{\text{CPI Index of year} \\ \text{that cost estimate} \\ \text{is available}} \times \text{Administrative and} \\ \text{Regulatory Costs}$$

---

<sup>1</sup>These numbers have been adjusted slightly to be consistent with EBMUD's Wastewater Solids Study.

The ENRCC and CPI are reported for the United States, as well as the San Francisco area. Before making any cost adjustments, determine which index was used. TABLES I & II report the ENRCC and CPI for San Francisco and the United States for the past eight years. If a national index has been used, convert it to an equivalent San Francisco index using the appropriate table. Then make the adjustment to 1977 constant dollars using the appropriate relationship presented above. If the index to be converted falls between the values reported, use linear interpolation.

Historic information for the period July 1969 to January 1977 is shown on TABLES I & II and plotted on FIGURE I. The ENRCC increased approximately 100 percent over this period while the CPI increased approximately 60 percent for the Bay Region. The ENRCC for San Francisco increased 12 percent from June 1975 to May 1976, while the San Francisco-Oakland CPI increased approximately 6 percent over the same period. The average annual rate of increase for the entire period was 13 percent for the ENRCC and 8 percent for the CPI.



TABLE 1

ENGINEERING NEWS RECORD  
CONSTRUCTION COST INDEX  
(ENRCC)<sup>1</sup>

Date	San Francisco <sup>2</sup>	U.S.-20 Cities Average <sup>2</sup>
January 1977	3100 <sup>3</sup>	2494
May 1976	2824	2328
June 1975	2518	2205
July 1974	2287	2041
June 1973	2224	1896
July 1972	2074	1726
June 1971	1709	1575
June 1970	1515	1369
July 1969	1525	1283

<sup>1</sup>Based on 1913 U.S. average = 100

<sup>2</sup>Numbers are rounded to tenths

<sup>3</sup>An ENRCC of 3100 is being used for consistency with EBMUD's Wastewater Solids Study. The reported ENRCC for January 1977 is 3104.

TABLE II

CONSUMER PRICE INDEX  
(CPI)<sup>1</sup>

Date	San Francisco- Oakland <sup>2</sup>	United States <sup>2</sup>
1977	170 <sup>3</sup>	174 <sup>4</sup>
1976	168	171
1975	159	161
1974	144	148
1973	132	133
1972	124	125
1971	120	121
1970	116	116
1969	110	110

<sup>1</sup>Based on 1967 average = 100;

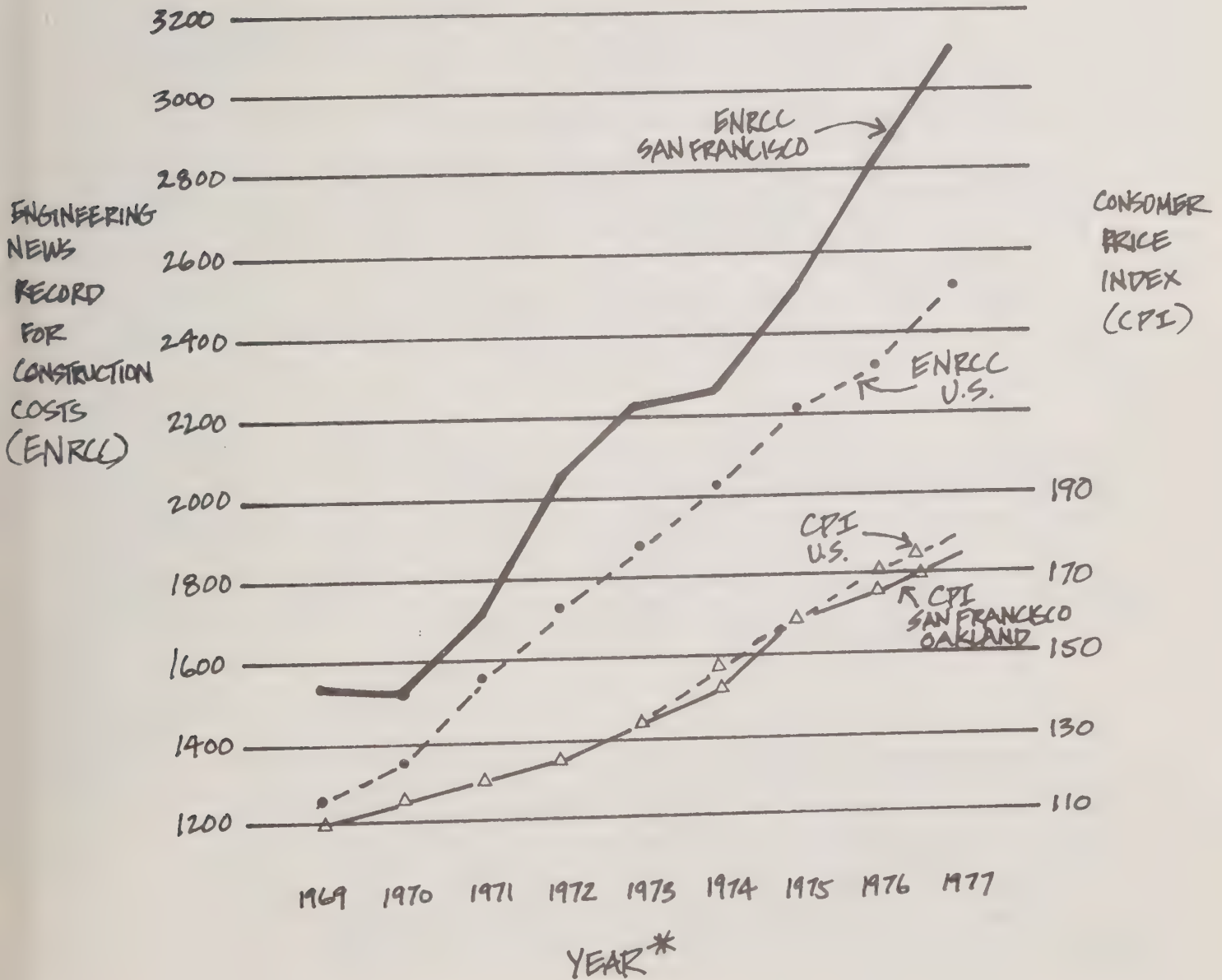
<sup>2</sup>Includes the counties of Alameda, Contra Costa, Marin, San Francisco, San Mateo, and Solano.

<sup>3</sup>The 1977 CPI is for the quarter ending December 31, 1976. A CPI of 170 is being chosen for consistency with EBMUD's Waste water Solids Study. The reported CPI for December 31, 1976 was 172.5.

<sup>4</sup>The 1977 CPI is for the quarter ending December 31, 1976. All other CPI's are annual averages.

FIGURE I

ENGINEERING NEWS RECORD INDEX AND  
CONSUMER PRICE INDEX FOR UNITED STATES  
AND SAN FRANCISCO BAY REGION



\*ALL POINTS PLOTTED FOR MID-YEAR  
(EXCEPT FOR 1977 WHICH IS  
PLOTTED FOR THE BEGINNING  
OF THE YEAR.)





DT: August 3, 1977

TO: County 208 Coordinators and ABAG EMP Staff

FM: Stan Hoffman, Analysis and Data Management  
Mary Kay Winton

RE: Cost Information for Estimating Personnel and Public Information Costs

The following data was collected for use in estimating personnel and public information costs for the environmental management program. The data presented can be used if you do not already have more specific cost information for your program.

The data for personnel costs and public information costs are given with examples to illustrate how the costs might be used.

#### Public Information Costs

Table I outlines costs associated with brochure printing/mailing and workshops. Postage is the most significant part of the cost of printing/mailing a brochure or any information item, and if you can include the brochure in another mailing (e.g. water bills) the cost is greatly reduced (see example A on page 5 ).

Workshop costs will vary with the size of workshop. It was assumed no rent for facility, since schools or public meeting halls are usually available at no charge. This cost information was provided by the ABAG Public Information Program.

#### Personnel Cost Information

In order to establish rule of thumb estimates for personnel in proposed environmental improvement programs, the data was assembled from selected counties and regional agencies by telephone interview. Again, this information can be used if you do not have more specific cost information for your program. The data reflects salary + benefits + overhead (overhead rate of 45% assumed). Overhead varies from county to county, but usually includes rent, supplies, equipment, furniture, general support staff and local travel. Therefore, only specific staff, above and beyond general support staff, should be included in any personnel cost estimates.

The information is summarized by county and department in Table II. County and departments can vary, however, and for a general estimate an average value for personnel can be used. Of the counties and department sampled, the average cost per person:

Cost/year	\$25,000
Cost/month	2,083
Cost/day	109

Cost/day assumed 230 working days/year, overhead rate of 45% assumed. If you have only a salary figure, you can use the average benefit rate of 25% and overhead rate of 45% to reach a total cost.

Table III summarizes personnel costs for three regional agencies: Regional Water Quality Control Board (RWQCB), Bay Area Air Pollution Control District (BAAPCD) and Association of Bay Area Governments (ABAG).

Average cost per person when using regional personnel is:

Cost/year	\$30,000
Cost/month	2,500
Cost/day	130

Cost/day assumed 230 working days/year, overhead rate of 45% assumed.

Examples of how this information might be used are given on page 5.

Each county has a public affairs/public information department, and they should be able to help you formulate public information strategies. There are several ways to disseminate information at little or no cost such as: public service radio spots or newspaper editorials/articles.

TABLE 1: PUBLIC INFORMATION COSTS

BROCHURES	Cost/Piece	Cost/10,000	Cost/20,000
1. <u>Graphics</u>			
a. 8½x11 flyer print 1 side	\$20.63	same	same
b. 8½x11 flyer both sides	\$34.38	same	same
c. Newsprint	\$110/day	graphics will vary greatly depending on extent of work involved	
2. <u>Printing</u>			
a. 8½x11 flyer print 1 side	3¢	\$300	\$600
b. 8½x11 flyer both sides	3¢	(ABAG does not charge more for both sides)	
c. Newsprint (Print at outside shop) 23"x 16"	set up costs the same, included in cost/piece	\$800 (8¢/piece)	\$800 (4¢/piece)
3. <u>Mailing</u>			
a. First Class (1 day delivery)	13¢	\$1,300	\$2,600
b. First Class Bulk (1-2 day delivery)	7.5¢	\$ 750	\$1,500
c. Bulk (3-7 day delivery)	3.5¢	\$ 350	\$ 700
WORKSHOP			
1. <u>Staff</u>			
a. Supervisor		\$175/day	
b. Assistant	one assistant for under 50 people	70/day	
	two assistants for over 50 people	140/day	
2. <u>Rent</u>			
Assume no rent for facility, since schools or public meeting halls are usually available at no charge.			
3. <u>Flyer/Mailing</u>			
Same cost figures as above.			

TABLE II: SAMPLED PERSONNEL COSTS BY SELECTED COUNTY AND DEPARTMENT

(Figure includes salary + benefits + overhead\*\*)

DEPARTMENT	AVERAGE PERSON COST				
	SANTA CLARA COUNTY	SAN MATEO COUNTY	SOLANO COUNTY	NAPA COUNTY	ALAMEDA COUNTY
Planning Cost/Year Cost/Month Cost/Day*	\$30,007 2,500 130	\$32,561 2,713 142	\$22,965 1,914 100		\$23,064 1,922 100
Sanitation Cost/Year Cost/Month Cost/Day*			not a separate dept.	\$21,358 1,780 93	\$22,636 1,886 98
Public Works Cost/Year Cost/Month Cost/Day*		\$34,851 2,904 151	\$24,252 2,021 105		
Transportation Cost/Year Cost/Month Cost/Day*	\$18,724 2,394 125			\$22,185 1,848 96	\$18,548 2,379 124
Flood Control Cost/Year Cost/Month Cost/Day*			in the public works dept.		\$21,726 1,810 94
Water District Cost/Year Cost/Month Cost/Day*	\$35,619 2,968 155				\$24,278 2,023 105
Building Inspection Cost/Year Cost/Month Cost/Day*					\$24,278 2,023 105

\*assumed 230 working days/year

\*\*assumed 45% overhead rate

TABLE III: SAMPLED PERSONNEL COSTS FOR REGIONAL AGENCIES

(Figure includes salary + benefits + overhead\*\*)

	RWQCB	ABAG	BAAPCD
Cost/Year	\$29,202	\$29,000	\$30,689
Cost/Month	2,433	2,416	2,557
Cost/Day*	126	126	133

\*assumed 230 working days/year

\*\*assumed 45% overhead rate



## EXAMPLES

### Estimating Public Information Costs

A. Assumptions: 8½" x 11" flyer, print 30,000 copies, mail bulk rate

graphics:	\$ 20.63
printing: 3¢ x 30,000	900.00
mailing: 3.5¢ x 30,000	<u>1,050.00</u>
TOTAL	\$1,970.63

Assumptions: same as above, but include with water bills

graphics:	\$ 20.63
printing: 3¢ x 30,000	<u>900.00</u>
TOTAL	\$ 920.63

B. Assumptions: 23" x 26" newspaper, print 30,000, mail bulk rate

graphics: 1 day	\$ 110.00
printing: 4¢ x 30,000	1,200.00
mailing: 3.5¢ x 30,000	<u>1,050.00</u>
TOTAL	\$2,360.00

C. Assumptions: 1 day workshop for 75 people, 1 supervisor, 2 assistants, 8½" x 11" flyer, print and mail bulk rate 500. No rent for facility

graphics:	\$ 20.63
printing: 3¢ x 500	15.00
mailing : 3.5¢ x 500	17.50
supervisor: 1 @ \$175	175.00
assistants: 2 @ \$70 each	<u>140.00</u>
TOTAL	\$ 368.13

### Estimating Cost of County Stream Litter Monitoring and Information Program

- Assumptions:
1. One person with cooperation from other public agencies which will inspect streams will be able to monitor all channels.
  2. Inspector will work for existing agency with water authorities e.g. Flood Control District
  3. Public information flyer will accompany water bills once a year (no postage costs).
  4. Program to start on: (specify start date)

### Administrative/Regulatory Costs:

Personnel Costs	\$ 25,000
(salary, benefits, overhead)	
Public Information Flyer Costs	<u>12,000</u>
(print 3¢ x 400,000)	
TOTAL	\$ 37,000 annual cost



ASSESSMENT / EVALUATION  
THE DATA INTERFACE BETWEEN THE SERIES 3 PROJECTIONS  
AND THE ENVIRONMENTAL MANAGEMENT PLAN  
TECHNICAL MEMORANDUM No. 3  
NOVEMBER 2, 1977

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## I. INTRODUCTION

This working paper describes the process through which the ABAG Series 3 population, employment, and land use projections<sup>1</sup> were converted for use in the Environmental Management Plan. The conversion was performed for three management plans: Municipal Facilities and Industrial Dischargers, Air Quality Maintenance, and Surface Runoff, which are discussed separately.

The Series 3 projections are the third in a series produced by ABAG and MTC since 1970. They project the growth and distribution of population, housing, employment and land uses in the San Francisco Bay Area. For Series 3 data analysis the ABAG region is divided into 440 zones (referred to as "440-zones"), and the data are presented at this level. Projections were made for the Base Year (1975) and projection years at five year increments through 2000. The Provisional Series 3 Projections included a high (Base Case 1) and a low (Base Case 2) Projection.

## II. MUNICIPAL FACILITIES AND INDUSTRIAL DISCHARGERS MANAGEMENT PLAN INTERFACE

The purpose of this task was to present the ABAG Series 3 population and employment data in a form suitable for determining sewage treatment plant (STP) wastewater pollution loadings. To do this, a conversion table between ABAG 440-zones and sewerage units (SU's) was constructed, and applied to the Series 3 440-zone data for the Base Year (1975) and the projections. Figure 1 presents a flow diagram of this process.

SU's are areas which are tributary to a certain STP. They were delineated in fig. 15-2 of the San Francisco Basin Plan<sup>2</sup> where they were referred to as Planning Units. To construct the conversion table, a mylar transparency of the ABAG 440-zones was overlaid upon the SU map, and two figures were determined: the percentage of the area of each 440-zone within each SU; and the percentage of the development of each 440-zone within each SU. By using the latter figure, the contribution of each 440-zone to the population of the SU can be determined, and these amounts summed to the total population of each SU. Adjustments were made in sewered zones to account for unsewered households. The results were presented in Water Quality Management Plans Technical Memo 113. Review of this document necessitated several revisions--in particular, a refinement of the SU boundaries in fig. 15-2 of the San Francisco Bay Basin Plan. The revised figures along with the modified SU boundary map are found in Water Quality Plans Technical Memo 154 presented as Appendix 1 of this report. The conversion table is presented as Appendix 2.

An extensive review was conducted on the Base Year (1975) and projected (1980, 1985, 1990, 1995, 2000) populations by SU. This involved careful comparison with the current and projected populations in local Water Quality Management Plan documents and 201 studies<sup>5</sup>, and review by the Municipal Facilities and Industrial Dischargers Management Plan Advisory Committee. Discrepancies were usually traced to differences between

local population projections and the provisional ABAG Series 3 Projections; the local agency review of the Provisional Series 3 figures has been the forum for the resolution of the above discrepancies.

The final part of the task was determining the actual pollutant loadings produced by each STP, as shown in Technical Memo 15. These loadings are then input to the ABAG San Francisco Bay mathematical model to determine water quality levels in San Francisco Bay. This effort is documented elsewhere.<sup>6</sup>

### III. AIR QUALITY MAINTENANCE PLAN INTERFACE

The Air Quality Maintenance Plan data analysis required air pollutant emissions for each square kilometer ( $\text{km}^2$ ) in the analysis area. This in turn required ABAG Series 3 population and employment variables presented by  $\text{km}^2$ . A system of computer programs was written to convert the Series 3 variables, produced by 440-zone, to  $\text{km}^2$  information.

#### Producing the Conversion Table

The system is illustrated in fig. 2. The Lawrence Berkeley Laboratory supplied a computer tape with the coordinates of the outlines of every census tract (CT) in the ABAG region. A computer program converted this tape of outlines to a list of the kilometer squares contained within each CT. UTM (Universal Transverse Mercator) coordinates were used throughout. Then, using a 440-zone/CT conversion table, another computer program produced a list of kilometer squares within each 440-zone. A special feature of this program was the assignment of split cells. When a kilometer cell was split by two or more 440-zones, the number of zones in the cell was recorded in the conversion table, and the Series 3 values were allocated consistent with this split as explained below. Finally, a program was written to perform minor corrections involving split zones (440-zones comprised of more than one CT) and zones too large to include in the previous programs. The conversion table includes more than 18,000 square kilometers.

This conversion table was thoroughly checked by overlaying stable base mylar transparencies of the 440-zones and UTM kilometer grids, at 1:125,000 scale. It was found that the LBL tape of CT outlines contained some distortions, so a subprogram was written to shift the distorted CT's. It was not possible to shift the entire region to within better than one kilometer accuracy, so while CT's within San Francisco and Oakland are correct to several hundred meters; Vallejo, for example, is one kilometer off. However, the distortion is gradual across the region and so there is never more than a 25 meter discrepancy between adjacent  $\text{km}^2$  grids.

This conversion table is too large to include in this report, but is available through ABAG, along with documentation of the above computer programs.



### Allocating the Series 3 Variables

Several methods of allocating the Series 3 variables to the km<sup>2</sup> grids were explored. An attempt was made to use LANDSAT satellite data to indicate where development was found within each 440-zone, and where there was undeveloped land, water, etc. A computer program was written to read the satellite data, which was presented for 17 land use categories\* by hectare (100m x 100m); determine which land use was dominant within each square kilometer (100 hectares = 1 square kilometer); and produce a map of the region by land use. At first glance the resulting map appeared to give an accurate mapping of regional development (fig. 3), but close inspection revealed that the distortions in the satellite data were sufficiently numerous to render them incompatible with the conversion table. Furthermore, the satellite data failed to discern many small pockets of development in rural areas, which was to be one of its main uses. It was felt that further work might have proved fruitful, particularly with new LANDSAT and CT data, but time considerations prevented further work from being performed.

It was then decided to allocate the Series 3 variables for each 440-zone uniformly over its constituent kilometer squares. The drawback to this procedure, as previously indicated, was that 440-zones with a non-uniform density of development, e.g., rural zones with small pockets of development or bodies of water, would be represented with air pollution emissions coming equally from every part. However, the importance of this inaccuracy was mitigated by two considerations. The non-uniform 440-zones are generally rural zones, in which there is only a slight difference between the actual emissions, which vary only slightly across the zone, and uniform emissions. The other consideration dealt with the application of the data. They were used primarily to determine the emissions which lead to photochemical oxidant, which is formed many kilometers downwind from the precursor emissions.\*\* As the precursor emissions are carried downwind they are subjected to wind mixing, and therefore their exact location becomes considerably less important. In fact, the photochemical oxidant analysis technique first combines the kilometer square emissions into 5 x 5 kilometer blocks, as a reflection of the above points.

A computer program was written to compute the density of each Series 3 variable for each 440-zone. To do this it simply divided each variable, e.g., population of the zone, by the size of the zone. Then another computer program was written to assign this density (e.g., 500 persons/km<sup>2</sup>) to each kilometer grid cell in the 440-zone, for each 440-zone, and for each variable. For example, when a grid cell was shared by three zones (as described above), a third of the kilometer amount was assigned to the grid cell from each of its constituent zones. Finally the information was written in the format required by the air quality model input program. Further details are found in the transmittal memo, Appendix 4 of this report.

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\*Appendix 3

\*\*Photochemical oxidant is formed by several hours of sunlight acting upon certain pollutants.

As a check on the allocation process, the gridded Series 3 variables were summed to the regional total and compared with the totals from the original Series 3 data. The agreement was excellent, for example:

		<u>Provisional Series 3 totals</u>	<u>Sum of km<sup>2</sup> gridded values</u>	<u>Accuracy</u>
1975	Population	4829151	4828996	0.003%
1975	Local Serving Employment	1095292	1094739	0.05%
1975	Basic Employment	951266	948595	0.3%
2000	Population (Base Case 2)	5407857	5418026	0.2%
2000	Local Serving Employment	1362180	1361601	0.1%
2000	Basic Employment	1101987	1093220	0.7%

#### IV. SURFACE RUNOFF MANAGEMENT PLAN INTERFACE

The purpose of this task was to present the ABAG Series 3 land use data in a form suitable for stormwater runoff pollution analysis. Since the mathematical model used to compute the amount of runoff pollution is referred to as MAC (Macroscopic Planning Model), the sub-watersheds which serve as the basic blocks for this data are called MAC subareas. There was a considerable county involvement in the review process for this task. This data conversion was different from the previous two described in that there was a land use-type conversion as well as a geographical area conversion. The procedure used is as follows (cf. fig. 4):

##### Land Use Categories

The land use categories required by the MAC model are the following:

- single family residential
- multiple family residential
- commercial
- light industrial
- heavy industrial
- open

The method employed for estimating acreages for single and multiple family residential is explained in Appendix 5. Because these estimates were based on a regional average ratio of single to multi-family lot size, county staffs were advised to carefully review these figures.

The breakdown between light and heavy industrial was provided primarily to aid the counties in assigning runoff pollution coefficients for the "industrial" category in the MAC model. Because the amount of industrial land in most MAC watersheds was not extensive, it was actually not necessary to run the MAC model using two categories of industrial.



The procedure used to calculate acreages of industrial and commercial land is described in Appendix 5. Appendix 6 presents the classification of the various SIC codes as either light or heavy industrial.

### Agricultural Land

The Series 3 projections did not produce estimates of agricultural land. The "open" category included agricultural land, grasslands, forest, vacant land in urban areas and all other types of undeveloped land. Since control measures for agricultural land might need to be examined, it was recommended that the counties make estimates of the amount of agricultural land in each subarea. Thus, the counties were asked to try to make MAC runs using two categories of undeveloped land--agriculture and other open.

### Geographical Conversion of Data From 440-Zones to MAC Subareas

A mylar transparency of the 440-zones was overlaid upon a map of MAC subareas, and two figures were determined: the percentage of the area of each 440-zone within each MAC subarea; and the developed area of each 440-zone within each MAC subarea. As in the case of the SU's, described previously, the latter figure can be used to compute the contribution of each 440-zone to the developed land uses of each MAC subarea. This conversion table is presented in Appendix 7, and the MAC watersheds listed by county in Appendix 8. Finally, a sample page of the transmittal information is presented in Appendix 9. This information was reviewed and sometimes modified by the county staffs, and then input to the MAC model to determine stormwater runoff pollutant loadings. The effects of these loadings on S.F. Bay are documented in reference 6.

FOOTNOTES

1. Provisional Series 3 Projections, ABAG, March 2, 1977.
2. Water Quality Control Plan Report, S.F. Bay Basin, California State Water Resources Control Board, 5/75.
3. Water Quality Management Plans Technical Memorandum 11: Provisional Series 3 Population and Employment Projections Through 1990, By Sewerage Unit, March 2, 1977.
4. Water Quality Management Plans Technical Memorandum 15: Estimated Municipal and Non-Discrete Industrial Wastewater Loads in the S.F. Bay Region, Revised Draft, May 31, 1977. (This memo is Appendix 1 of this report.)
5. Detailed plans for individual wastewater facilities; as required under Sec. 201 of the 1972 Federal Water Pollution Control Act Amendments.
6. Water Quality Management Plans Technical Memoranda 19, 21 and 23: Preliminary and Further S.F. Bay Modeling Results (I and II), June 7, July 5, and August 2, 1977. There may be further memoranda in this series.

FIGURE 1:

FLOW DIAGRAM OF THE CONVERSION FROM SERIES 3 DATA TO SEWERAGE UNIT (S.U.) DATA, FOR POINT SOURCE WATER QUALITY ANALYSIS

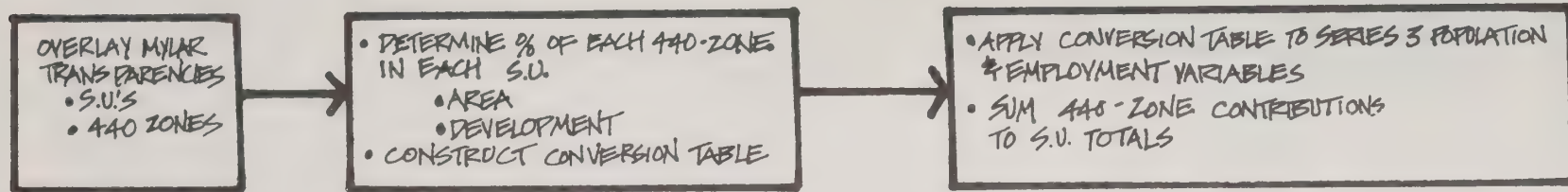


FIGURE 4:

FLOW DIAGRAM OF THE CONVERSION FROM SERIES 3 DATA TO MAC SUBAREA DATA, FOR SURFACE RUNOFF WATER QUALITY ANALYSIS.

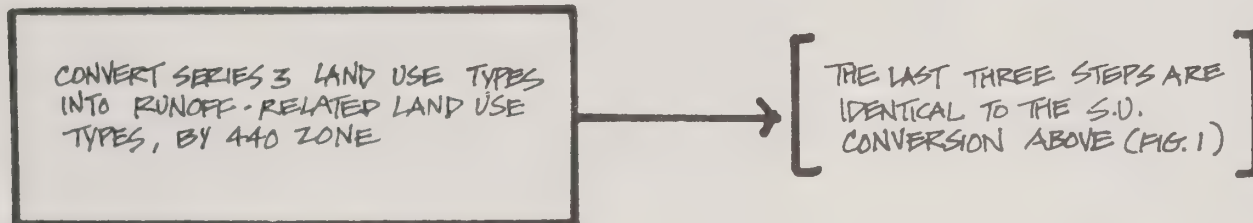


FIGURE 2:

# FLOW DIAGRAM OF CONVERSION FROM SERIES 3 DATA TO KILOMETER-GRIDDED DATA FOR AIR QUALITY ANALYSIS

INPUTS:

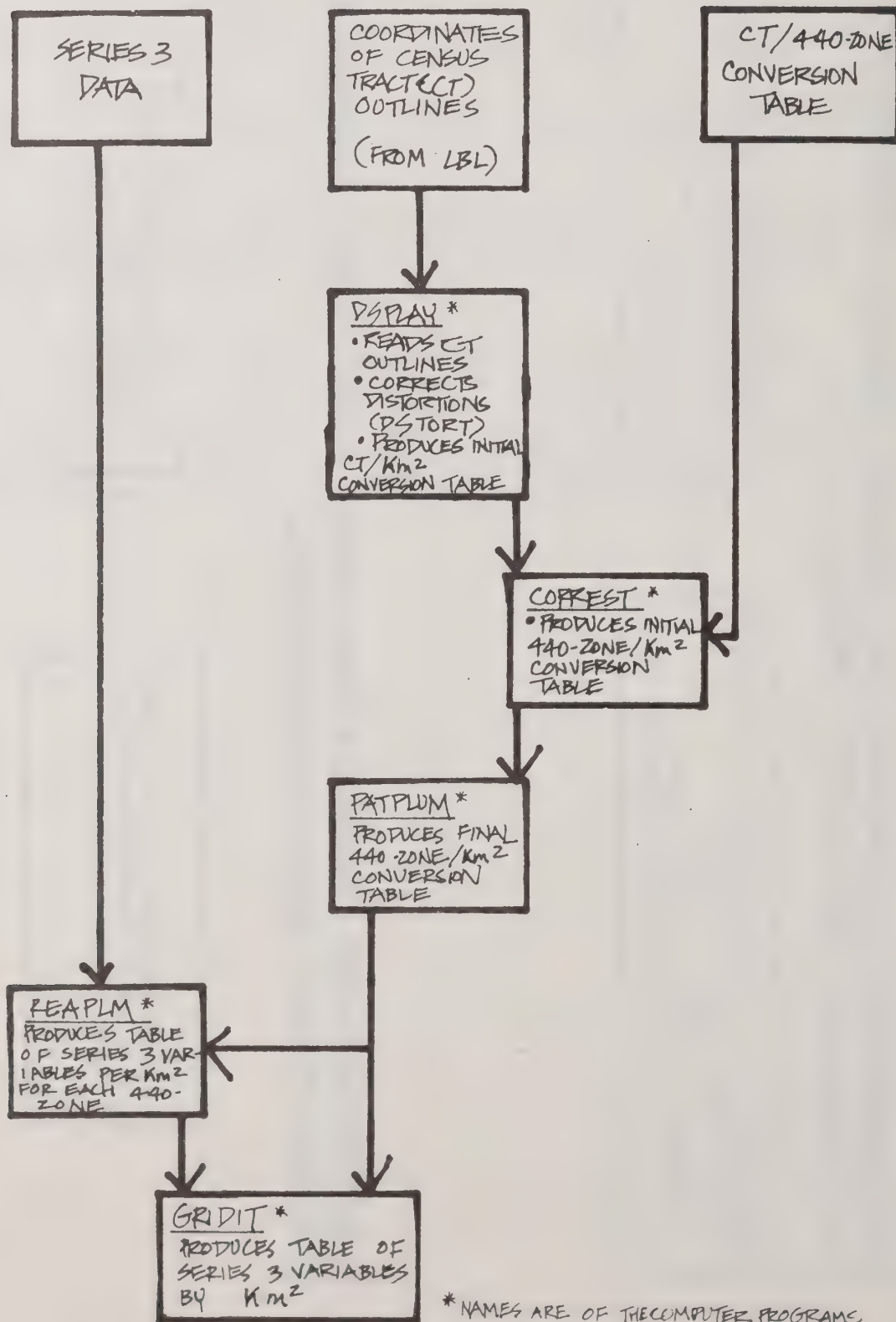




Figure 3

LANDSAT Satellite Image  
of the Bay Region

See Appendix 3 for  
numerical code;  
each 2-digit number  
on the image (e.g.  
15 for water) represents  
the predominant land  
cover for a square  
kilometer.

There is a 20% north-  
south elongation in this  
particular image.

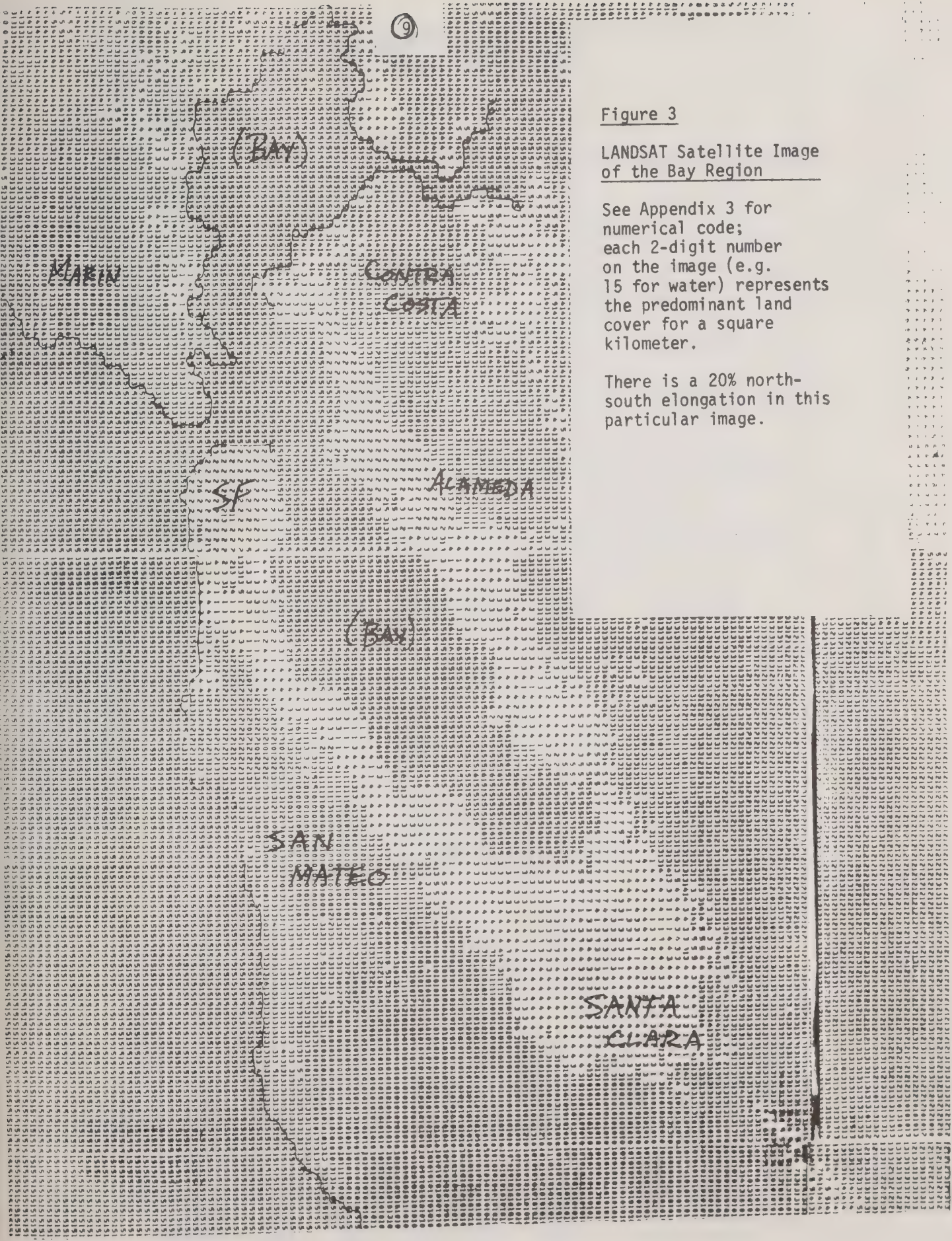


TABLE 3. Estimated Municipal and Non-Discrete Industrial Wastewater Loads After Treatment in 1980

	Population Served	Domestic Flow gpcd	Flow mgd	Indust Flow mgd	ADWF mgd	BODs		TSS		TN		TP		N-NH <sub>3</sub>		
			mgd			mg/l	ppd	mg/l	ppd	mg/l	ppd	mg/l	ppd	mg/l	ppd	
Marin-Sonoma																
1	Richardson Bay	10108	85	0.8	0	0.8	30	200	30	200	30	200	20	133	20	133
2	Sausalito	15216	90	1.4	0	1.4	30	350	30	350	30	350	20	233	20	233
3	Tiburon	7891	100	0.8	0	0.8	30	200	30	200	30	200	20	133	20	133
4	Mill Valley	17538	85	1.5	0	1.5	30	375	30	375	30	375	20	250	20	250
5	Ross Valley	54808	85	4.7	0	4.7	30	1175	30	1175	30	1175	20	783	20	783
6	San Rafael-San Quentin	33353	122	4.1	0	4.1	30	1025	30	1025	30	1025	20	683	20	683
7	Las Gallinas-Marín Bay	28528	80	2.3	0	2.3	30	575	30	575	30	575	20	383	20	383
8	Novato-Hamilton	50489	90	4.5	0	4.5	30	1125	30	1125	30	1125	20	750	20	750
9	Petaluma	46246	100	4.6	0	4.6	30	1150	30	1150	30	1150	20	767	20	767
10	Sonoma	20410	100	2.0	0	2.0	30	500	30	500	30	500	20	333	20	333
		28458		26.7	0	26.7		6675		6675		6675		4448		4448
Napa-Solano																
11	Napa-American Canyon	54453	100	5.4	0.3	5.7	5	237	15	713	10	475	5	237	3	142
12	Vallejo-Mare Island	76250	100	7.6	0.5	8.1	30	2026	30	2026	30	2026	15	1013	20	1351
13	Benicia	9840	85	0.8	0.4	1.2	30	300	30	300	30	300	10	100	15	150
14	Fairfield-Suisun-Travis	66129	100	8.6 <sup>a</sup>	3.1	11.7	10	975	10	975	20	1951	20	1951	3	292
		206672		22.4	4.3	26.7		3538		4014		4752		3301		1935
Contra Costa																
15	East County <sup>a</sup>	7715	85	0.7	0	0.7	30	175	30	175	20	116	10	58	15	87
16	Antioch	33985	80	2.7	0.08	2.8	30	700	30	700	20	476	10	233	15	350
17a	Pittsburg	34553	85	2.9	0.95	3.9	30	975	30	975	20	650	10	325	15	487
17b	CCCSO 7A & 7B															
18a	Central CCCSO-Concord	346796	103 <sup>b</sup>	35.7	-	35.7	2.0	595	1.0	297	2.0	595	10	2977	2	595
18b	Mt. View															
19	Crockett-Port Costa	3840	100	0.4	0	0.4	30	100	30	100	30	100	10	33	15	50
20	Rodeo	11060	100	1.1	0	1.1	30	275	30	275	30	275	10	91	10	91
21	Pinole-Hercules	18417	100	1.8	0	1.8	30	450	30	450	30	450	10	150	15	225
22	San Pablo	63011	100	6.3	0.43	6.7	30	1676	30	1676	25	1396	15	838	15	838
23	Richmond	52141	100	5.2	1.81	7.0	30	1751	30	1751	25	1459	30	1751	15	875
		571526		56.8	3.3	60.1		6697		6399		5416		6456		3598
East Bay																
24	EBMUD	583519	113	65.9	11.3	77.2	30	19315	30	19315	30	19315	10	6438	20	12676
25	San Leandro	45165	80.3	3.6	3.5	7.1	30	1776	30	1776	20	1184	40	2368	10	592
26	Oro Loma-Castro Valley	135800	90.1	12.2	0.5	12.7	30	3177	30	3177	25	2647	40	4236	20	2118
27	Hayward	115193	102	11.7	1.7	13.4	30	3352	30	3352	20	2235	10	1117	10	1117
28	Newark	197071	78.5	15.5	2.3	17.8	30	4453	30	4453	30	4453	40	5938	20	2969
29	Fremont															
30	Alvarado															
		1076748		108.9	19.3	128.2		32073		32073		29834		20097		19672

APPENDIX 1:  
Sample table  
from Tech. Memo.  
No. 15

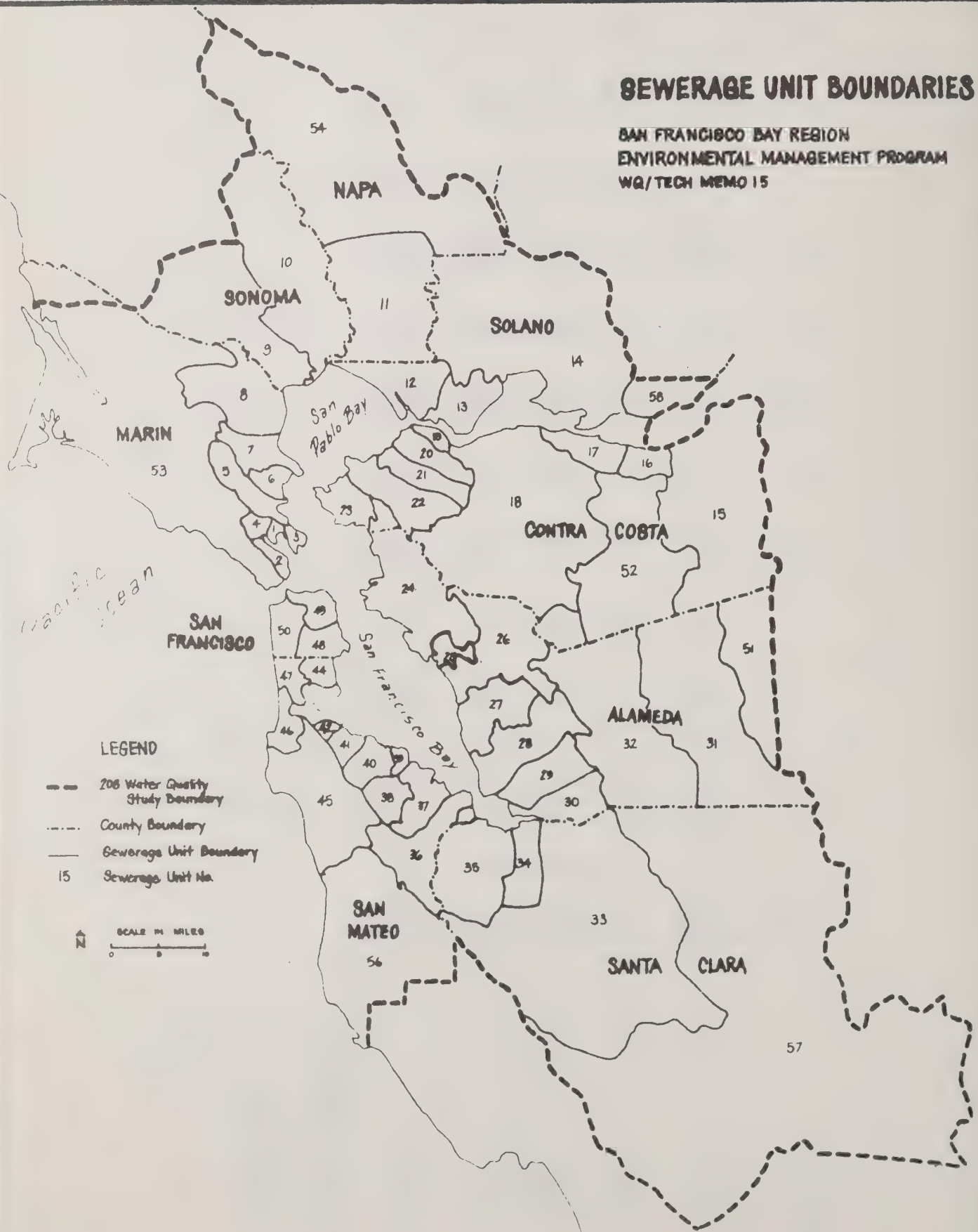


TABLE 3 (continued)

Livermore Valley																
31	Livermore	50255	93.2	4.7	0.3	5.0	30	1251	30	1251	30	1251	30	1251	20	834
32a	VCSD	70589	90	6.4	1.3	7.7	30	1926	30	1926	30	1926	30	1926	20	1284
32b	Pleasanton	120844		11.1	1.6	12.7		3177		3177		3177		3177		2118
South Bay																
33	Santa Clara - San Jose - Milpitas	907923	100	90.8	41.8 <sup>1</sup>	132.6	10	11058	10	11058	25	27647	20	22117	3	3317
34	Sunnyvale	105027	100	10.5	10.3 <sup>1</sup>	20.8	10	1734	10	1734	25	4336	20	3469	3	520
35	Palo Alto	175423	100	18.5 <sup>c</sup>	6.9	25.4	10	2118	10	2118	25	5295	10	2118	3	635
		1188373		119.8	59.0	178.8		14910		14910		37278		27704		4472
San Mateo																
36	Menlo Park	50745	85.7	5.3 <sup>c</sup>	0.6	5.9	10	492	8	393	30	1476	20	984	20	984
37	Redwood City	76452	89.7	7.7 <sup>d</sup>	1.0	8.7	10	725	8	580	30	2176	20	1451	20	1451
38	San Carlos-Belmont	51333	83.3	4.3	1.0	5.3	10	442	8	353	30	1326	20	884	20	884
39	Estero	23843	80	2.1 <sup>e</sup>	0	2.1	10	175	8	140	30	525	20	350	20	350
40	San Mateo	81913	100	9.9 <sup>f</sup>	0	9.9	10	825	8	660	30	2476	20	1651	20	1651
41	Burlingame	30858	100	3.1	0.4	3.5	30	875	30	875	30	875	10	291	20	583
42	Millbrae	21164	100	2.1	0	2.1	30	525	30	525	30	525	20	350	20	350
43	SSF - Airport - San Bruno	78823	92	8.3 <sup>g</sup>	1.3	9.6	30	2401	30	2401	20	1601	5	400	15	1200
44	Guadalupe Valley**	26318	90	-	-	-	-	-	-	-	-	-	-	-	-	-
45	Montara-Granada-Half Moon Bay	12870	85	1.4 <sup>j</sup>	0	1.4	30	350	30	350	30	350	30	350	15	175
46	Pacifica	42674	85	3.6	0	3.6	30	900	30	900	30	900	15	450	20	600
47	N. San Mateo	77663	94	7.3	0	7.3	30	1826	30	1826	30	1826	30	1826	20	1217
		574656		55.1	4.3	59.4		9536		9003		14056		8987		9445
San Francisco																
48	Southeast	156194	68	13.0 <sup>m</sup>	4.4	23.7 <sup>1</sup>	30	5929	30	5929	30	5929	10	1976	20	3953
49	North Point	301216	68	20.5	4.7	64.2 <sup>1</sup>	30	16062	30	16062	30	16062	10	5354	20	10708
50	Richmond-Sunset	210571	68	14.3	1.2	20.9 <sup>1</sup>	30	5229	30	5229	30	5229	10	1734	20	3486
		667981		47.8	14.7	108.8 <sup>1</sup>		27220		27220		27220		9073		18147
Other Areas within 208 Boundaries																
51	Alameda County***															
52	Contra Costa County***															
53	Marin County***		90		0		10		15		15		10		3	
54	Napa County															
55	San Mateo County***		100		0.2		30		30		25		20		3	
56	Santa Clara County															
57	Solano County***															
	TOTAL	4691000		449	106	601		103800		103500		128400		83200		63800

# SEWERAGE UNIT BOUNDARIES

SAN FRANCISCO BAY REGION  
ENVIRONMENTAL MANAGEMENT PROGRAM  
WQ/TECH MEMO 15





## Appendix 2: SEWERAGE UNIT/440-ZONE CONVERSION TABLE

Each Sewerage Unit (SU) can be assigned to as many as three 440-zones. The zone number is followed by a SU number and percent of the zone within the SU. Note that this is done for land area and also for population. If there is only one SU after the zone number, then 100% of the zone is in the SU.

The SU's are numbered 1-50. Areas within the 208 study boundary but not in a SU are numbered 91-99, by county - e.g., SU "93" is the portion of Marin (county 3 alphabetically, see below) within 208 but not in an assigned SU. Areas of a county not in the 208 area are numbered 991-999, again by county - so Santa Rosa (440-zone 38) is assigned 999.

Example--The first line of the conversion table:

91% of the land area of zone 1 is not in a SU, but is within 208, and therefore assigned to SU 93. The other 9% of zone 1 is in SU 2. However, only 5% of the population of zone 1 is in "SU" 93, while 95% is in SU 2.

County numbers:

- |                  |                |
|------------------|----------------|
| 1. Alameda       | 6. San Mateo   |
| 2. Contra Costa  | 7. Santa Clara |
| 3. Marin         | 8. Solano      |
| 4. Napa          | 9. Sonoma      |
| 5. San Francisco |                |



[illegible]





[illegible]

95	34	5			33	95	34	5			33	95	34	5		
20	35	80			34	20	35	80			34	20	35	80		
55	33	45			34	60	33	40			34	55	33	45		
25	33	40	35	35	34	30	33	40	35	30	34	65	33	25	35	10
40	35	60			36	40	35	60								
60	37	40			36	60	37	40			36	60	37	40		
55	36	45			37	57	36	43			37	55	36	45		
15	36	85			37	60	36	40			37	30	36	70		



[illegible]



## APPENDIX 3: LANDSAT LAND USE CATEGORIES

Developed

1. Commercial/Industrial
2. Residential (attached)
3. Residential (detached, pre-1955)
4. Residential (detached, post 1955)

Agriculture

5. Grain/Hay
6. Summer Annual Crop (dark soil)
7. Summer Annual Crop (light soil)
8. Biennial-Perennial Crop
9. Orchard

Undeveloped

10. Forest
11. Woodland
12. Brush
13. Grass (sparse)
14. Grass (thick)

Aqueous

15. Water
16. Marsh
17. Saltpans



DT: March 2, 1977

FM: Bob Frommer

TO: Mike Kim

RE: Series 3 Data

The Series 3 projections are available disaggregated to 1-km<sup>2</sup> grid size for the entire 9-county S.F. Bay region. 24 variables, comprised of population and economic data, are provided for the 12,000 km<sup>2</sup> region for the Base Year (1975) and for the projection years 1980, 1985 and 1990. There are two sets of projections - Base Case 1 and Base Case 2, the former representing a higher population and economic growth rate. Further details concerning the projections are available through ABAG.

The data tapes at LBL contain the following variables: IX, IY, P(1), P(2), . . . P(24); for each grid cell, written with the format statement:  
1X, 13I6/1X, 13I6

The variables are:

IX	X coordinate of the grid	P(12)	MFG 4
IY	Y coordinate of the grid	P(13)	MFG 5
P(1)	No. Dwelling Units	P(14)	MFG 6
P(2)	Residential Population	P(15)	TRAN
P(3)	Employed Residents	P(16)	WHOL
P(4)	Group Quarters Population	P(17)	FIN
P(5)	Basic Employment	P(18)	SRV 1
P(6)	Local Serving Employment	P(19)	SRV 2
P(7)	AGRE	P(20)	GOV
P(8)	MIN	P(21)	Retail Trade
P(9)	MFG 1	P(22)	Business Services
P(10)	MFG 2	P(23)	Retail Services
P(11)	MFG 3	P(24)	Other Local Serving

Note that P(7)-P(20) are numbers of Basic employees while P(21)-P(24) are local serving employees. The abbreviations are explained in the attached table.

THIS RUN OF DEMOD4 77/02/17 01.45.48 IS CALLED PENTAP BEMOD TEST RUN FROM 70 TO 75 TAPE OUTPUT FOR PROJECTION 1970 TO 1975

\*\*\* MSS-LIMDEL,BPF10AABF10A

\*\*\* \*\*

VAR 1 = JVEC -- JVEC IS THE INTERNAL BEMOD SORT ORDER  
 VAR 3 = CLUN -- COUNTY NUMBER COMBES. TO ALPHABETICAL ORDER  
 VAR 5 = AGRI -- AGRIC., FORESTRY, FISHERIES - SIC 01, 07, 08, 09  
 VAR 7 = MFG1 -- LOCAL FINAL DEMAND MARKETS - SIC 27  
 VAR 9 = MFG3 -- FOOD EXPORT - SIC 20  
 VAR11 = MFG5 -- FAB. MFT., MACH., TRANS. EQUIP. - SIC 34, 35, 37  
 VAR13 = TRAN -- LONG DISTANCE TRANS. - SIC 40, 42, 44, 45, 46  
 VAR15 = FIM. -- FINANCE AND INSURANCE - SIC 62, 63, 67  
 VAR17 = SPV2 -- INSTITUTIONAL SERVICES - SIC 82, 84, 89  
 VAR19 = ALAND1 -- AVAILABLE INDUSTRIAL ACREAGE  
 VAR21 = AVONON -- OTHER AVAIL. ACREAGE (WITHOUT URBAN SERVICES)  
 VAR23 = BLAND -- NET BASIC ACREAGE  
 VAR25 = FLAND -- NET RESIDENTIAL ACREAGE  
 VAR27 = TLAND -- TOTAL LAND AREA

VAR 2 = SMSA -- STANDARD METROPOLITAN STATISTICAL AREA  
 VAR 4 = ZONE -- 440 TRAFFIC ANALYSIS ZONE DEFINED BY MTC JAN 1974  
 VAR 6 = MIN. -- MINING - SIC 10, 13, 14  
 VAR 8 = MFG2 -- HEAVY INDUSTRY - SIC 26, 28, 29, 30, 32, 33  
 VAR10 = MFG4 -- NEW TECHNOLOGY - SIC 19, 36, 38  
 VAR12 = MFG6 -- OTHER MANUFACTURING - SIC 22, 23, 24, 25, 31, 39  
 VAR14 = WHOL -- WHOLESALE TRADE - SIC 50, 52  
 VAR16 = SPV1 -- BUSINESS SERVICES - SIC 73  
 VAR18 = GOV. -- FEDERAL AND STATE GOVERNMENT - SIC 91, 92  
 VAR20 = AVOINF -- OTHER AVAIL. ACREAGE (WITH URBAN SERVICES)  
 VAR22 = ULAND -- UNUSABLE ACREAGE  
 VAR24 = LSLAND -- NET LOCAL SERVING ACREAGE  
 VAR26 = STLAND -- STREETS AND HIGHWAYS

## Appendix 5: DETAILS OF THE SURFACE RUNOFF LAND USE DISAGGREGATION PROCESS

A brief description of the process of disaggregation of ABAG Series 3 land uses to MAC land uses follows:

### RESIDENTIAL ACREAGE

Using the following four Series 3 variables by 440-zone\*:

- o Occupied Dwelling Units (ODU)
- o Fraction of DU's that are single family DU's (FSNGL)\*\*
- o Residential Acreage (RES) = Series 3 residential acreage
- o Streets and Highways (the portion allocated to residential land uses)\*\*

the following calculations were made:

- o Gross Residential Acreage (GRRES) = Residential Acreage + Residential Streets and Highways
- o Single Family DU's (SDU) = ODU x FSNGL
- o Multiple Family DU's (MDU) = ODU - SDU.

Then using the regional ratio of single family lot size/multiple family lot size = 7,

- o Single Family Residential Acreage (SFRES) =  $GRRES \times \frac{1}{1 + MDU/(7 \times SDU)}$   
and
- o Multiple family residential acreage (MFRES) = GRRES - SFRES.

### EMPLOYMENT ACREAGES

This calculation uses the following Series 3 variables by 440 zone:

- o Basic Employees
- o Local Serving Employees
- o Streets and Highways (the portion allocated to the employment land uses)\*\*
- o Basic Employment Acreage
- o Local Serving Employment Acreage
- o a breakdown to 18 categories of Basic and Local Serving Employees.\*\*\*

Gross basic and local serving acreages are first calculated by adding the roadway acreage. Next, each of the 18 categories of employees is assigned a percentage to heavy industry, light industry, and commercial, and a weighted average is used to determine an acreage/employee figure.\*\*\*\* Then, acreages are calculated for heavy and light industry and commercial.

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\*Provisional Series 3 Projections, Appendices A, B. (Reference 1)

\*\*Available through ABAG.

\*\*\*Appendix 5

\*\*\*\*This calculation uses figures from Estimating Land and Floor Area Implicit in Employment Projections, Federal Highway Administration, 1970.



Since regional average figures were used in parts of the above calculation, certain systematic discrepancies were found in the data and corrected. In densely settled areas (e.g., central business districts), the Series 3 employment acreage was less than the acreage calculated here, due to denser than average acreages/employee. In this case, the three calculated acreages--heavy, light industrial, and commercial--were proportionally adjusted to sum to the Series 3 total.

In the other case, when the calculated employment acreage is less than the Series 3 total, inspection of individual 440 zones revealed that large areas of low density employment has been designated. It was decided, in this case, to allocate only one-half of the difference between the calculated and Series 3 employment acreages to employment acreage, and to allocate the other one-half to the vacant infrastructure-served land category. This procedure represents the large low density parcels as smaller areas, which more accurately reflects the amount of runoff produced.

## APPENDIX 6 - Runoff Pollution Categories - Employment Land Uses

INDUSTRIAL CATEGORIES	CLASSIFI- CATION	PERCENT EMPLOYEES IN HEAVY*	ACREAGE/ EMPLOYEE**
Mining	Heavy	100%	
Manufacturing 1		0%	.0195
SIC 27      Printing & Publishing	Light		
Manufacturing 2 (Heavy Industry)		0%	.1684
SIC 26      Paper	Heavy		
28      Chemicals	Heavy		
29      Petroleum Refining	Heavy		
30      Rubber & Plastics	Heavy		
31      Stone, Clay & Glass	Heavy		
39      Primary Metals	Heavy		
Manufacturing 3 (Food & Kindred Products)		100%	.0518
SIC 20      Food Processing	Heavy		
Manufacturing 4 (New Technology)		0%	.0435
SIC 19      Ordnance	Light		
36      Electrical Equipment	Light		
28      Instruments	Light		
Manufacturing 5 (Transportation Equipment)		100%	.0498
SIC 34      Fabricated Metals	Heavy		
35      Machinery (except electrical)	Heavy		
37      Transportation Equipment	Heavy		
Manufacturing 6 (Other Manufacturing)		35%	.0269
SIC 22      Textiles	Heavy		
23      Apparel	Light		
24      Lumber	Heavy		
25      Furniture	Light		
31      Leather	Heavy		
39      Misc. Manufacturing	Heavy		

\*Calculated as the percentage of employees of each SIC grouping engaged in heavy industry. Employment figures from: EDD Wage and Salary Workers in Non-Agricultural Establishments, by Industry (figures for San Francisco-Oakland SMSA only, 1975 average).

\*\*See Appendix 5

INDUSTRIAL CATEGORIES		CLASSIFI- CATION	PERCENT EMPLOYEES IN HEAVY*	ACREAGE/** EMPLOYEE
Transportation			95%***	.5370
<u>SIC</u>				
40	Rail	Heavy		
42	Truck	Heavy		
44	Water	Heavy		
45	Air	Heavy		
46	Pipeline	Light		
Wholesale Trade			100%	.0296
<u>SIC</u>				
50	General Wholesale	Heavy		
52	Building Supplies	Heavy		
Construction			40%	****
<u>SIC</u>				
15	Building Construction	Heavy		
16	Heavy Construction	Heavy		
17	Special Trade	Light		
Local Transportation, Communication, Utilities			64%	****
<u>SIC</u>				
41	Suburban Transportation	Heavy		
47	Transportation Services	Heavy		
48	Communication	Light		
49	Electric, Gas & Sanitary	Light		
COMMERCIAL CATEGORIES				
Finance, Insurance (Basic)			0%	.0144
<u>SIC</u>				
62	Securities & Commodities	Light		
63	Insurance	Light		
67	Holding & Investment	Light		
Service 1 (Basic Business Service)		Light	0%	.0458
Service 2 (Basic Institutional Services)		Light	0%	.0246
Government (Federal & State)		Light	0%	.0219
Retail Trade		Light	0%	.0426
Local Finance		Light	0%	****
Retail Services		Light	0%	.1591
Professional Services		Light	0%	.0306
Local Government		Light	0%	****

\*Calculated as the percentage of employees of each SIC grouping engaged in heavy industry. Employment figures from: EDD Wage and Salary Workers in Non-Agricultural Establishments, by Industry (figures for San Francisco-Oakland SMSA only, 1975 average).

\*\*See Appendix 5

\*\*\*Figures were not available by two digit breakdown. This percentage is a rough estimate.

\*\*\*\*These four categories were grouped into an "other local-serving designation", and assigned an acreage/employee figure of .0522.

Appendix 7: MAC SUBAREA/440-ZONE CONVERSION TABLE

Each MAC subarea can be assigned to as many as three 440-zones. The first three columns of the table are subarea identification: the county number (see Appendix 8), the MAC watershed (see Appendix 8), and the subarea (1 = A: protected; 2=B: developing; 3=C: developed). The next column is the 440-zone number, followed by the percentage of the area of the zone within the MAC subarea. The next two columns are, for the base year and the projections respectively, the percentage of the development of the 440-zone within the subarea. The next page presents an annotated example, in Appendix 9.



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County	Watershed	Sub-area	440-zone	% of area	(disregard these columns)				dp of 1975 development	dp of projected development		
1	1	1	199	16.	442000	5.	1	1	199	5.	0.	
			198	2.	441100	10.			198	0.	0.	
			200	2.	443200	50.			200	0.	0.	
		2	198	4.						5.	10.	
			199	53.						20.	30.	
			200	6.						30.	15.	
			204	35.						30.	30.	
		3	196	100.	441700	100.		3				
			197	100.	441800	100.						
			199	31.					80.	70.		
			200	65.					60.	75.		
			195	15.					30.	20.		
			201	100.	444100	100.						
			202	100.	444300	100.						
			203	100.	442300	100.						
			204	60.					70.	60.		
	2	1	187	32.					00.	0.		
			198	25.					15.	15.		
			211	2.	450700	2.		211	0.	0.		
		2	187	19.					0.	5.		
			194	14.					20.	18.		
			198	34.					5.	10.		
		3	194	33.					30.	42.		
			195	85.					70.	80.		
			198	20.					75.	65.		
			200	21.					10.	10.		
			190	9.	437100	10.		190	3.	0.		
			204	5.					0.	10.		
	3	1	186	40.					0.	30.		
			183	2.					0.	10.		
			187	24.	435100	25.		187	0.	0.		
		2	186	10.					30.	30.		
			183	5.					0.	20.		
			187	19.					40.	60.		
		3	170	45.	433400	100.		3	170	45.	45.	
			175	4.	432500	10.			175	4.	4.	
			176	100.	433100	100.						
			177	100.	433300	100.						
			178	100.	433700	100.						
			179	100.	433000	100.						
			180	61.					60.	65.		
			181	100.	430500	100.						
			182	37.					70.	65.		
			183	27.					100.	70.		
			184	100.	430900	100.						
			185	100.	435400	100.						
			186	10.					70.	40.		
			187	6.					60.	35.		
			188	100.	435200	100.						
			189	100.	436200	100.						
			190	91.	437000	100.		190	97.	100.		
			191	100.	437400	100.						
			192	100.	438200	100.						
			193	100.	438000	100.						
			194	53.					50.	46.		
	4	1	153	22.	409900	25.		4	1	153	5.	5.
			180	19.					10.	8.		
			186	40.	430100	40.			186	0.	0.	
			182	63.					30.	35.		
		3	152	100.	408000	100.		3				
			153	78.	409200	75.			153	95.	95.	

		154	100.	408300	100.				
		155	100.	408200	100.				
		156	100.	407400	100.				
		157	100.	406900	100.				
		158	78.	406600	75.			158	78.
		159	31.	407100	100.			159	31.
		169	100.	409000					
		170	55.	432400	100.			170	55.
		171	100.	409000					
		172	74.	407300	50.			172	74.
		173	100.	409300	100.				
		174	100.	410100	100.				
		175	96.	409100	100.			175	96.
		180	20.					30.	27.
5	3	140	100.	401800	100.	5	3		
		141	100.	401700	100.				
		142	100.	403200	100.				
		143	100.	402600	100.				
		144	100.	402700	100.				
		145	100.	403500	100.				
		146	100.	405200	100.				
		147	100.	403800	100.				
		148	100.	426100	100.				
		149	100.	404200	100.				
		150	31.	404500	60.			150	50.
		151	100.	404600	100.				
		158	22.	404800	100.			158	22.
		159	69.	406200	100.			159	69.
		160	100.	405700	100.				
		161	100.	406000	100.				
		162	100.	427400	100.				
		163	100.	427600	100.				
		164	100.	427300	100.				
		165	100.	428400	100.				
		166	100.	427100	100.				
		167	100.	428200	100.				
		168	100.	428300	100.				
		172	26.	407300	50.			172	26.
6	3	123	100.	421500	100.	6	3		
		124	100.	421100	100.				
		125	100.	420100	100.				
		126	100.	420300	100.				
		127	100.	422000	100.				
		128	100.	421800	100.				
		129	100.	421700	100.				
		130	100.	422500	100.				
		131	100.	400100	100.				
		132	100.	422700	100.				
		133	100.	422800	100.				
		134	100.	423000	100.				
		135	100.	425100	100.				
		136	100.	400700	100.				
		137	100.	400200	100.				
		138	100.	401000	100.				
		139	100.	401300	100.				
		150	69.	404400	100.			150	50.

7	2	84	20.			20.	20.		
7	3	208	51.			80.	80.		
7	3	209	4.			30.	30.		
7	3	211	1.			50.	50.		
8	1	211	4.			0.	0.		
8	1	211	1.			0.	0.		
8	1	217	5.			5.	5.		
8	2	210	3.			0.	0.		
8	2	212	29.			20.	20.		
8	2	213	20.			20.	20.		
8	2	214	7.			0.	0.		
8	2	215	14.			0.	0.		
8	2	216	4.			40.	40.		
8	3	205	30.			50.	50.		
8	3	206	98.			100.	100.		
8	3	207	59.			100.	100.		
8	3	208	5.			0.	0.		
8	3	209	1.			0.	0.		
8	3	210	2.			60.	60.		
8	3	84	13.			50.	50.		
9	1	216	21.			5.	5.		
9	1	217	15.			15.	15.		
9	2	215	44.			90.	90.		
9	3	212	68.			80.	80.		
9	3	213	80.			80.	80.		
9	3	214	93.			100.	100.		
9	3	215	10.			0.	0.		
10	1	211	38.			0.	0.		
10	1	216	1.			0.	0.		
11	1	198	5.			0.	0.		
11	1	199	3.			0.	0.		
11	1	205	33.			0.	0.		
11	1	207	24.			0.	0.		
11	1	209	64.			40.	40.		
11	1	210	91.			20.	20.		
11	1	211	48.			30.	30.		
11	1	212	3.			0.	0.		
11	1	215	30.			10.	10.		
11	1	216	39.			20.	20.		
11	1	217	1.			1.	1.		
11	1	84	61.			0.	0.		
11	1	83	24.			25.	25.		
2	1	1	81	7.	304000	10.	81	3.	3.
			83	31.	355100	40.	83	2.	0.
		2	80	63.				70.	50.
			82	96.	303100	100.	82	100.	100.
	2	1	81	37.	304000	52.	81	10.	10.
			83	8.	355100	11.	83	0.	0.
	3	2	83	8.	355300	28.	83	10.	10.
			84	30.	345100	75.	84	25.	25.
			85	100.	345200	100.			
			86	100.	344000	100.			
			87	100.	346200	100.			
			88	100.	346100	100.			
			90	100.	350000	100.			
			93	100.	349000	100.			
			94	54.	351100	97.	94	20.	40.
			95	80.	347000	78.	95	99.	95.
			99	18.	338300	23.	99	0.	5.
		3	94	46.	341000	100.	94	80.	60.
			96	100.	340000	100.			
			97	100.	325000	100.			
			98	100.	339000	100.			
			99	82.	338300	77.	99	100.	95.
			100	100.	338100	100.			
			101	100.	337200	100.			

102 100. 334000 100.				(32)			
		103 100.	330000 100.			106 75.	65.
		104 100.	328000 100.			40.	50.
		105 100.	323000 100.			83 83.	45.
		106 70.	321100 57.			10.	10.
		108 25.				1.	5.
4	2	83 16.	355100 3.	4	2	107 40.	30.
	3	108 48.				25.	35.
5	1	95 10.	347000 22.	5	1	40.	35.
		107 20.	356000 20.			80.	70.
	2	106 30.	321100 43.	6	1	95.	80.
	3	108 17.				95 0.	0.
		109 60.	316000 100.			107 0.	0.
6	1	91 70.	353000 70.				
		92 100.	354000 100.				
		95 10.					
		107 36.	356000 71.				
	2	114 100.	360100 100.				
	3	111 100.	364000 100.				
		112 100.	365000 100.				
		113 100.	366000 100.				
9	1	107 45.	356000 9.				
	2	110 100.	358000 100.				
	2	109 40.	357000 100.				
12	1	83 5.	355100 7.				
	2	80 37.					
		82 4.	303200 9.				
	3	76 60.					
		77 79.	307100 100.				
		78 100.	306000 100.				
		79 100.	308000 100.				
13	1	83 5.	355100 1.				
		108 10.					
	3	73 100.	314100 100.				
		74 100.	309000 100.				
		75 100.	313100 100.				
		76 40.					
		77 21.	307200 30.				
14	1	83 27.					
		84 30.					
	2	84 25.					
	3	84 15.					
15	1	89 100.	352100 100.				
		91 30.	353000 30.				
16	3	115 100.	371000 100.				
		116 100.	381000 100.				
		117 100.	378000 100.				
		118 100.	373000 100.				
		119 100.	362000 100.				
		120 100.	386000 100.				
		121 100.	383000 100.				
		122 100.	385100 100.				
17	2	81 56.	301000 100.				
6	1	24 11.4					
7	1	23 10.6					
8	1	23 27.1					
4	3	17 100.					
		25 94.					
		26 100.					
		27 100.					
		28 100.					
		29 30.					
		30 55.					
5	2	23 .7					
		29 68.					
		30 40.					



3	3	12	100.			
		13	100.			
		14	100.			
		15	100.			
		16	100.			
		18	100.			
		19	100.			
2	3	6	100.			
		8	100.			
		9	100.			
		10	100.			
		11	100.			
		20	100.			
		21	30.	100.	100.	
1	3	1	31.	95.	95.	
		2	100.			
		3	100.			
		4	100.			
		5	100.			
		7	28.	97.	96.	
13	1	1	69.	5.	5.	
		7	70.65	0.	0.	
		24	12.6	0.	0.	
	3	7	1.35	3.	4.	
		24	.9	57.	55.	
9	1	23	6.7	20.	21.	
		24	23.5	17.	19.	
		21	2.	0.	0.	
10	1	21	68.	0.	0.	
		22	22.	0.	0.	
		23	18.2	14.	13.	
		25	6.	0.	0.	
11	3	22	78.	100.	100.	
12	1	24	51.6	5.	3.	
14	1	23	9.	4.	4.	
		29	2.	0.	0.	
		30	5.	2.	2.	
15	1	23	17.7	8.	8.	
4	1	1	47	11.	25.	
		48	45.	20.	35.	
		48	22.	4.	20.	
		50	59.	0.	0.	
		51	10.	32.	32.	
	2	47	10.	3.	5.	
		48	1.	38.	38.	
		50	18.	0.	0.	
		51	5.	57.	57.	
	3	47	2.	53.	53.	
		50	3.	67.	60.	
2	1	48	52.	3.	30.	
		51	43.	17.	3.	
		52	33.	9.	5.	
		53	34.	0.	0.	
		55	11.	5.	0.	
	2	50	20.	26.	00.	
		51	27.	77.	85.	
		52	14.	81.	95.	
		53	11.	7.	30.	
		55	14.	71.	20.	
	3	51	5.	100.	100.	
		54	100.	24.	20.	
		55	2.	5.	0.	
3	1	53	45.	2.	5.	
		55	43.	5.	0.	
	2	53	10.	3.	45.	
		55	27.	64.	64.	
	3	55	3.			

4	1	52	30.
	2	52	3.
5	1	3 408	40.
		417	80.
		418	20.
		419	100.
		420	100.
		421	100.
		422	100.
		423	90.
		426	20.
		427	100.
		428	100.
		429	100.
		430	100.
		431	100.
		432	100.
		433	100.
		434	100.
		435	100.
		436	100.
		437	100.
		438	60.
		439	100.
		440	100.
2	3	381	90.
		382	100.
		383	100.
		384	100.
		385	60.
		386	100.
		387	100.
		388	100.
		389	30.
		393	20.
		394	30.
		395	100.
		396	100.
		397	100.
		408	30.
		411	30.
		412	50.
		413	100.
		414	100.
		415	100.
		416	100.
		417	20.
		418	80.
		423	10.
		424	100.
		425	100.
		426	80.
		438	40.
3	3	367	100.
		368	100.
		369	100.
		370	100.
		371	100.
		372	100.
		373	100.
		374	90.
		375	60.
		376	30.
		379	100.
		380	100.
		381	10.

			2.	2.
			4.	4.
1	3	408	50.	50.
		417	80.	80.
		418	20.	20.
		423	90.	90.
		426	20.	20.
		438	60.	60.
		381	90.	90.
		385	60.	60.
		389	30.	30.
		393	20.	20.
		394	30.	30.
		408	25.	25.
		411	30.	30.
		412	50.	50.
		417	20.	20.
		418	80.	80.
		423	10.	10.
		426	80.	80.
		438	40.	40.
		374	90.	90.
		375	60.	60.
		376	30.	30.
		381	10.	10.

			385	40.				385	40.	40.
			389	70.				389	70.	70.
			390	100.						
			391	90.				391	60.	60.
			392	50.				392	60.	60.
			394	30.				394	50.	50.
4	3		374	10.				374	10.	10.
			375	40.				375	40.	40.
			376	70.				376	70.	70.
			377	100.						
			378	100.						
			391	10.				391	40.	40.
			392	50.				392	40.	40.
			393	80.				393	80.	80.
			394	40.				394	20.	20.
			398	100.						
			399	100.						
			400	100.						
			401	100.						
			402	100.						
			403	100.						
			404	100.						
			405	100.						
			406	100.						
			407	100.						
			408	30.				408	25.	25.
			409	100.						
			410	100.						
			411	70.				411	70.	70.
			412	50.				412	50.	50.
6	1	3	346	100.	603100	100.		1	3	
			347	100.	602700	100.				
			362	100.	601400	100.				
10	3		363	100.	600800	100.				
10	2		365	100.	600400	100.		2	2	
2	2		366	66.	600100	60.				
3	3		348	100.	603600	100.		3	3	366 100. 65.
			349	100.	602400	100.				
			350	100.	604100	100.				
			351	100.	603800	100.				
			357	100.	602300	100.				
			358	100.	602000	100.				
			359	100.	601800	100.				
			360	100.	602500	100.				
			361	100.	601600	100.				
			364	100.	601300	100.				
	1		366	44.	600100	60.				
4	3		331	100.	605600	100.		4	3	366 0. 35.
			343	100.	605300	100.				
			344	100.	604900	100.				
			345	100.	604500	100.				
			352	100.	603900	100.				
			353	100.	604200	100.				
			354	100.	604400	100.				
			355	100.	605100	100.				
			356	100.	604300	100.				
5	3		332	100.	605700	100.				
			333	100.	606800	100.				
			336	100.	606400	100.				
			337	100.	605900	100.				
			338	100.	607600	100.				
6	3		307	100.	611700	100.				
			311	100.	612500	100.				
			312	100.	611500	100.				
			313	100.	610400	100.				
			314	100.	610700	100.				

		315	100.	611300	100.				
		319	100.	609800	100.				
		320	100.	610800	100.				
		321	100.	609300	100.				
		322	100.	610200	100.				
		323	100.	610300	100.				
		324	100.	609100	100.				
		325	100.	608600	100.				
		326	100.	608700	100.				
		327	100.	607200	100.				
		334	100.	607100	100.				
		335	100.	606700	100.				
		339	100.	607500	100.				
		340	100.	607800	100.				
		341	100.	607900	100.				
		342	100.	608100	100.				
7	3	306	100.	611800	100.				
		308	100.	611900	100.				
		309	100.	612100	100.				
		309	100.	612300	100.				
		310	100.	612600	100.				
		316	100.	612900	100.				
7	1	305	100.	613100	100.	10	1		
		317	100.	613300	100.				
8	1	328	100.	613800	100.				
9	1	330	69.	613500	66.	11	1	330	90.
5	1	330	31.	613500	34.	12	1	330	10.
		318	100.	609600	100.				
	9	2	329	100.	613700	100.	9	2	
7	1	1	241	94.					
			304	37.				100.	100.
								5.	5.
	3	242	100.	507701	100.		3		
		243	25.	507801	50.			243	23.
		282	51.	509101	80.			282	51.
		283	50.	508301	100.			283	50.
		284	100.	509901	100.				
		285	100.	509801	100.				
		286	100.	510300	100.				
7		287	100.	510801	100.				
		288	100.	509301	100.				
		289	100.	509200	100.				
		298	37.	504601	100.			298	30.
		299	100.	510600	100.				25.
		300	100.	511000	100.				
		301	100.	511200	100.				
		302	100.	511300	100.				
		303	100.	511400	100.				
		304	63.						
								95.	95.
7	2	1	241	6.				0.	0.
	3	239	94.	507301	100.		3	239	100.
		238	30.	507201	60.			238	30.
		240	100.	507500	100.				
		243	75.	507801	50.			243	77.
		244	100.	508001	100.				
		245	100.	507901	100.				
		246	100.	506201	100.				
		247	100.	507401	100.				
		248	100.	506601	100.				
7		250	63.	506301	100.			250	63.
		273	64.					75.	64.
		275	100.						
		276	100.	506101	100.				
		277	100.						
		278	100.	505301	100.				
		279	100.	508201	100.				
		280	100.	508701	100.				



		281	100.	508600	100.				
		282	49.	509101	20.	(37)	282	49.	49.
		283	50.	508302	75.		283	50.	50.
		290	100.	504801	100.				
		291	23.					10.	22.
		298	26.					30.	50.
3	1	223	100.	511800	100.	3	1		
	2	224	100.	511901	100.		2		
		225	100.	512001	100.				
		226	57.					90.	75.
3	230	100.	503104	100.		3		50.	38.
	231	27.							
	232	100.	502500	100.					
			503003	100.					
	233	100.	502904	100.					
	234	100.	502901	100.					
	235	100.	502701	100.					
	236	100.	506801	100.					
	237	100.	507000	100.					
	238	100.							
	249	100.							
	250	37.	506302	40.			250	37.	37.
	251	100.	502101	100.					
	252	100.	502200	100.					
	253	100.	502300	100.					
	254	100.	501900	100.					
	255	100.	501700	100.					
	256	100.	500900	100.					
	259	100.	500100	100.					
	260	100.	500200	100.					
	261	100.	500300	100.					
	262	100.	500400	100.					
	263	100.	505800	100.					
	264	100.	500500	100.					
	265	100.	500700	100.					
	271	100.	505100	100.					
	272	100.	505203	100.					
	273	36.					25.	36.	
	274	100.	505600	100.					
	291	34.					80.	50.	
	298	14.					23.	12.	
4	1	217	35.				35.	35.	
		293	61.				0.	0.	
		294	59.				0.	0.	
		295	26.				0.	0.	
4	2	221	100.	512100	100.	4	2		
		226	43.					10.	25.
		227	100.	503302	100.				
		268	100.	504200	100.				
3	228	100.	503301	100.		3			
	229	100.	503201	100.					
	231	73.					50.	62.	
	257	100.	503400	100.					
	258	100.	501400	100.					
	266	100.	503501	100.					
	267	100.	503502	100.					
	269	100.	503800	100.					
	270	100.	503701	100.					
	273	36.	505201	50.			273	25.	36.
	291	43.						10.	43.
	292	100.	504301	100.					
	293	29.						100.	100.
	294	41.						100.	100.
	295	74.						100.	100.
	296	100.	504405	100.					
	297	100.	504501	100.					

			298	23.	504602	35.		298	17.	13.
	5	1	222	100.	512200	100.	5	1		
		2	218	100.	512500	100.		2		
			219	100.	512400	100.				
			220	100.	512300	100.				
	6	1	217	28.					28.	28.
8	1	1	64	6.					0.	1.
			56	50.					2.	10.
			57	22.					0.	0.
			61	30.					0.	0.
			62	85.					0.	0.
			63	28.					5.	7.
		2	56	20.					2.	40.
			57	17.					1.	30.
			58	15.					5.	15.
			62	8.					10.	30.
			63	49.					10.	30.
		3	56	30.					96.	50.
			57	61.					99.	70.
			58	85.					95.	85.
			59	100.						
			60	100.						
			61	70.					100.	100.
			62	7.					90.	70.
			63	23.					85.	63.
	2	1	65	28.					3.	6.
			66	46.					0.	5.
			67	7.					1.	1.
			64	82.					2.	2.
			56	5.					0.	0.
		2	65	6.					37.	65.
			66	19.					10.	30.
			64	10.					6.	78.
		3	65	1.					60.	29.
			66	35.					90.	65.
			67	93.					99.	99.
			64	2.					92.	20.
	3	1	68	20.					10.	10.
			65	65.					0.	0.
		2	68	5.					2.	2.
9	2	1	34	16.					1.	0.
			35	15.					3.	6.
		2	34	11.					4.	10.
			35	4.					2.	2.
			41	1.					0.	0.
		3	34	1.					11.	8.
	3	1	32	1.					0.	0.
			34	15.					0.	0.
		2	32	2.					2.	2.
			34	19.					28.	45.
	3	3	34	2.					37.	30.
4	1	1	32	3.					0.	0.
			34	19.					17.	6.
		2	32	8.					0.	0.
			34	14.					2.	1.
	5	1	23	6.					5.	1.
			30	10.					0.	0.
		2	23	3.					14.	2.
			29	20.					8.	2.
			30	9.					0.	0.
	1	1	31	1.					0.	0.
			32	2.					0.	0.
			33	2.					0.	0.
		2	31	1.					0.	0.
			32	7.					4.	3.
			33	23.					37.	14.

	3	32	1.		2.	2.
		33	1.		2.	1.
6	1	31	1.		0.	0.
		32	6.		0.	0.
		34	1.		0.	0.
	2	31	29.		28.	40.
		32	17.		26.	58.
		33	1.		2.	2.
	3	31	17.		70.	42.
		32	2.		57.	33.
7	1	31	4.		0.	0.
		32	18.		4.	2.
		33	1.		0.	0.
	2	31	47.		2.	2.
		32	22.		4.	2.
		33	6.		0.	0.
		34	1.		0.	0.

Appendix 8: MAC WATERSHED NUMBERING SYSTEM

<u>COUNTY</u>	<u>MAC WATERSHED</u>
1. Alameda	1. Fremont 2. Lower Alameda 3. Hayward 4. San Leandro 5. Lake Merritt 6. Berkeley 7-11. Upper Alameda 1-5
2. Contra Costa	1. Marsh Creek 2. Kellogg Creek 3. Walnut Creek 4. Diablo 5. Alhambra 6. San Pablo 9. Pinole 12. Antioch 13. West Pittsburg 14. Upper Alameda Creek 15. Upper San Leandro Creek 16. Richmond 17. Delta Lowland
3. Marin	1. Richardson Bay 2. Corte Madera Creek 3. San Rafael 4. Novato 5. San Antonio Creek 6-8. Tomales Bay - A1, A2, A3 9-11. Lagunitas - A1, A2, A3 12. Pt. Reyes Seashore 13. Bolinas-Stinson 14. Petaluma Valley 15. (Out of 208 area)
4. Napa	1. Upper Napa River 2. Middle Napa River 3. American Canyon 4. Wooden Valley
5. San Francisco	1. North Shore 2. North Point 3. Southeast 4. Richmond-Sunset



<u>COUNTY</u>	<u>MAC WATERSHED</u>
6. San Mateo	1. Pacifica 2. Brisbane 3. South San Francisco 4. Millbrae-Burlingame 5. San Mateo Creek 6. Belmont-Atherton 7. San Francisco 8. Pescadero Creek 9. Half Moon Bay 10. Merced
7. Santa Clara	1. Palo Alto-Mt. View 2. Sunnyvale, Saratoga, Cupertino 3. San Jose Southwest 4. Coyote-Silver 5. Llagas-Uvas Creeks 6. Pacheco
8. Solano	1. Vallejo-Benicia 2. Fairfield-Suisun 3. Collinsville-Montezuma Hills
9. Sonoma	1. Penngrove 2. Glen Ellen 3. Sonoma 4. Bayside 5. San Antonio 6. Petaluma 7. Petaluma River

APPENDIX 9: SAMPLE MAC SUBAREA LAND USE TABULATION

ABAG SERIES 3/MAC LAND USE ACREAGES FOR

1985 HIGH

COUNTY - ALAMEDA

MAC WATERSHED - FREMONT (NO. 1)

SUB-WATERSHED - C

TOTAL RESIDENTS = 135460.

TOTAL EMPLOYEES = 30730.

ACRES

ACRES

TOTAL AREA =

35631.

RESIDENTIAL LAND USES (INCLUDING ROADWAYS)

TOTAL RESIDENTIAL =

8717.

SINGLE FAMILY RESIDENTIAL =

8280.

MULTI-FAMILY RESIDENTIAL =

438.

EMPLOYMENT LAND USES

TOTAL INDUSTRIAL =

1362.

HEAVY INDUSTRIAL =

1307.

LIGHT INDUSTRIAL =

55.

TOTAL COMMERCIAL =

1756.

OPEN ACREAGE

OPEN LAND =

23795.

(INCLUDES C. ACRES OF ROADWAYS  
IN VACANT INFRA-STRUCTURE SERVED  
LAND)PLEASE CHECK ESTIMATES OF SINGLE/MULTIPLE RESIDENTIAL  
AND HEAVY/LIGHT INDUSTRIAL AND COMMERCIAL ACREAGE

AVE. SINGLE FAMILY LOT SIZE = .246 (OR 4.072 D.U./ACRE)

AVE. MULTI-FAMILY LOT SIZE = .036 (OR 27.432 D.U./ACRE)

(PER DWELLING UNIT (D.U.))

Assessment/Evaluation Technical Memorandum 4 is the same as AQMP Technical Memorandum 15 (January 1978). The memorandum appears in full in Air Quality Technical Materials, Appendix G volume.





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